UNIVERSAL MODEL AIR-PLANE NEWS

JULY 1934

20¢

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for Model Builders

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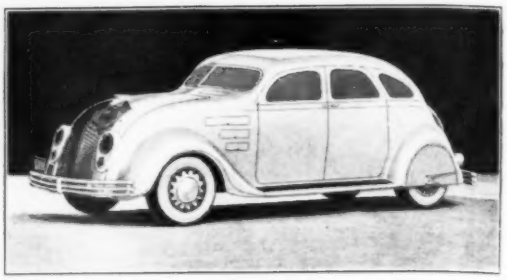
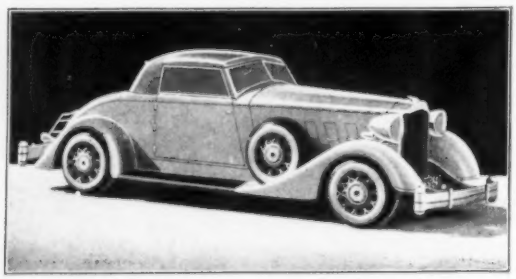
STREAMLINE AUTOMOBILES



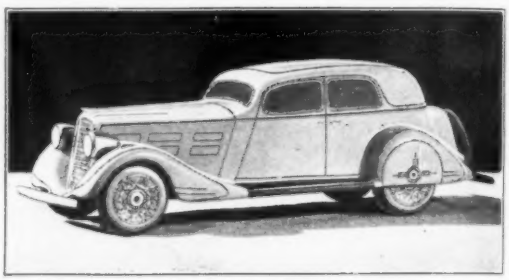
CHRYSLER-Airflow (*) Note the ultra modern lines—the radiator front—built in headlights—a realistic model. (*Copyrighted name used with permission of Chrysler Corporation.)

$1.50 EACH POSTPAID Complete with Tools

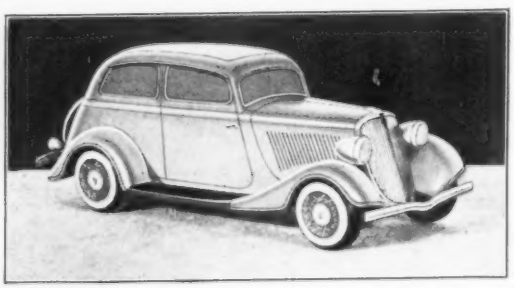
The new kit sensation for model builders. Just feast your eyes on these brand new models! A genuine thrill awaits you! Scientific Miniature Auto Show is on! Build Streamline Automobile Models and you'll say "they're great." This new hobby will take the country like wildfire. Know your cars!



PACKARD Custom body: convertible roadster. Look at the windshield—What a beautiful model! "Ask the boy who builds one."



NASH Brougham—What speed, dash and smartness in this new streamline Nash model. Reproduced line for line from the original new Nash car.



FORD V-8 Victoria—A beautiful replica of the new Ford. Smooth looking, with that V shaped radiator and slanting windshield. Easy to build.

Each Kit Contains

- Finished wheels
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- Semi-finished balsa body
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- Radiator ornaments printed on balsa
- Radiator printed on silver paper
- License plates printed on silver balsa
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- Camel hair brush
- Full-size coping saw
- Model making knife
- Sandpaper
- Large bottle High-Gloss Lacquer
- 2 bottles of High-Gloss Lacquer for trimming
- Full size plans with explicit instructions

Scientific's Streamline Automobile Kits are complete to the minutest detail. Not only do they include precision cut parts, and a liberal supply of everything, but also the necessary tools which may be used for countless other things.

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GUARANTEED FLYERS! . . . Build them! Fly them! The biggest kit values money can buy! In addition to the 2 models illustrated below.

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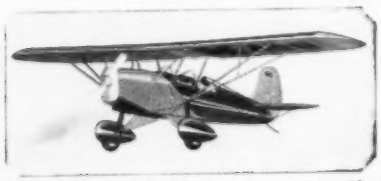
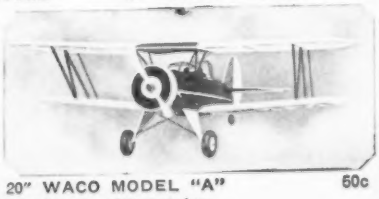
20" CURTISS "GOSHAWK"
20 VICKERS "JOCKEY"
20 NIEUPORT "SCOUT"
20" STINSON "RELIANT"



20" FAIRCHILD "22" 50c



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Scientific dealers everywhere feature our line.

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. . . *a dashing new*

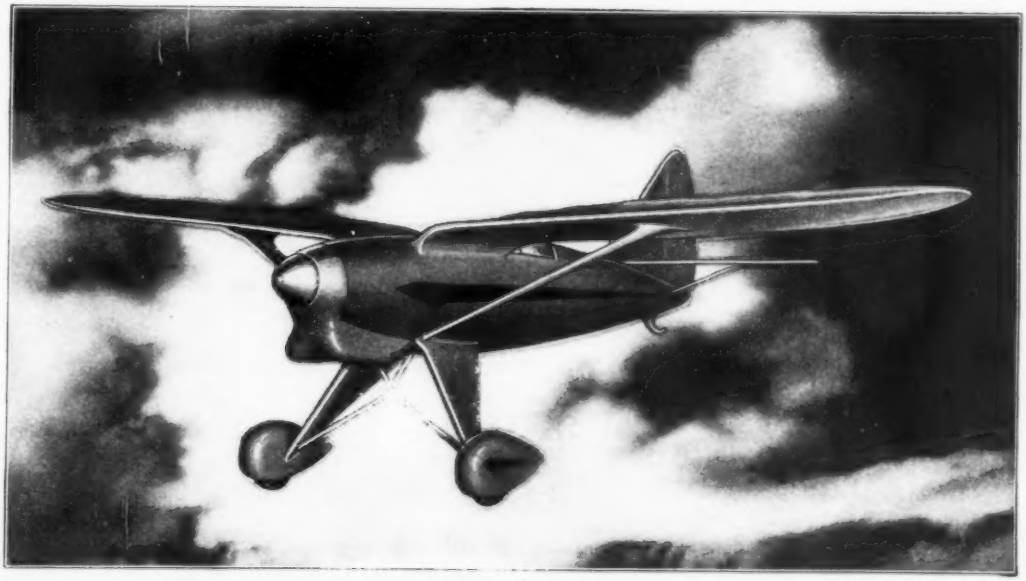
WANNER FLYING MODEL!

George D. Wanner is pleased to present this new and different flying model, the SCARLET TANAGER. It is an exclusive model made only by us. Because of its beauty and flyability will be one of the most popular models ever offered the model enthusiast. Be the first in your community or club to finish and fly the beautiful SCARLET TANAGER.

a **BEAUTY** *in* **DESIGN** *and in* **FLIGHT**

SCARLET TANAGER NO. 23

Type.....Racing 2 place Inclosed cockpits
Wing span .....24"
Chord .....4½" average
Length (overall)..17 ¾"
Inverted...12 cyl. engine
Split type landing gear
Gull Wing ..(monoplane)
Propeller .....8" dia.



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$1.50 Each

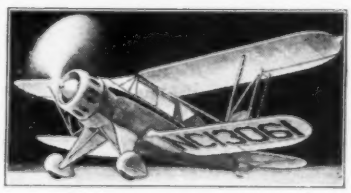
HAVE YOU BUILT THE THREE MASTER-MODELS SHOWN BELOW?

LEOPARD MOTH—D.H. 85

The very latest of the DeHavilland "Moths." Due to its superior performance, cruising speed 120 M.P.H., fuel consumption less than 6 gallons per hour or 20 miles per gallon, it replaces the popular "Puss Moth."

Winner of the 1933 King's cup race, average speed 139.5 miles per hour for 803 miles.

NEW FEATURES: Our model has FLYABILITY PLUS. 24" wing span. Folding Wings. Adjustable aelerons and Rudder. Send in your order today for our Model No. 28. Each **$1.25**



WACO "C" CABIN TYPE BIPLANE

No. 26—Wing Span 22 inches.

A flying model of the most popular Cabin biplane, the famous Waco "C," the very latest in Waco's fine line of biplanes. The model is extremely light when compared with its large wing area and this, together with its unusual stability, accounts for its unusual flying qualities. Plans include photographs. True-Pitch semi-finished propeller, all parts imprinted on balsa. Specially priced. Order by number today. Each **$1.25**

DOUGLAS Y10-43 OBSERVATION PLANE

No. 27—Wing Span 24 inches

When put through its paces at Wright Experimental Field the prototype of this model attained speeds of 200 miles an hour. It is the Army's latest observation plane. Parasol type wing makes it an outstanding flyer. Authentic to the minutest detail. Weight, 1.7 oz. Plans include photographs, True-Pitch propeller, all parts imprinted on best grade balsa..... **$1.25**

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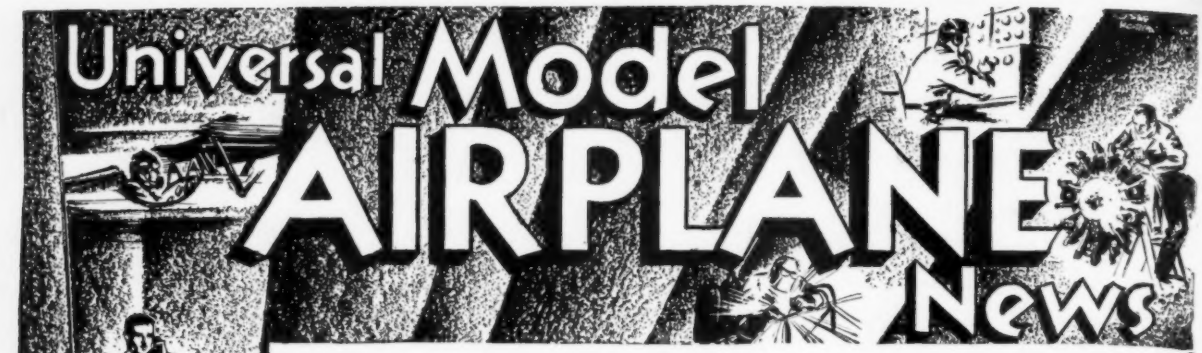

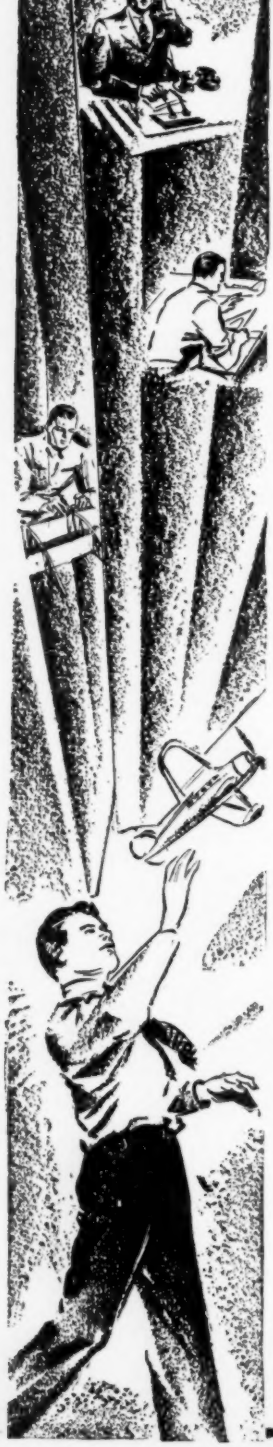

VOL. X *No. 6*

Edited by Charles Hampson Grant

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JULY—1934

In Our Next Issue

A great treat awaits you. Prof. Alexander Klemin gives you inside information about the wind tunnel and its use in the first article of a series entitled **Building Models for the Wind Tunnel.**

Building a Flying Model Beechcraft, by R. V. Grover and F. T. Roberts gives you data and plans to build an excellent flying model of one of the finest commercial planes.

Mr. Edwin T. Hamilton continues his course in model building in **Fundamentals of Model Airplane Building,** giving data and plans to build a simple power model that flies beautifully.

The second part of **The Albatros Fighters on Parade,** by Joe Nieto, gives more secrets that were the underlying cause of the success of the German wartime Albatros planes.

Build This World Record Twin Pusher, by August Ruggeri shows you how you can create a model that has placed among the winners in several contests.

Robert C. Morrison gives valuable data on the latest planes, and plans to build a solid scale model of the Army Y10-40 Douglas Observation plane. Here is a neat job for you to build.

The Aerodynamic Design of the Model Plane, Air Ways, Aviation Advisory Board, How The Aeroplane Was Created, and three view drawings make the August issue a gold mine of information and pleasure.

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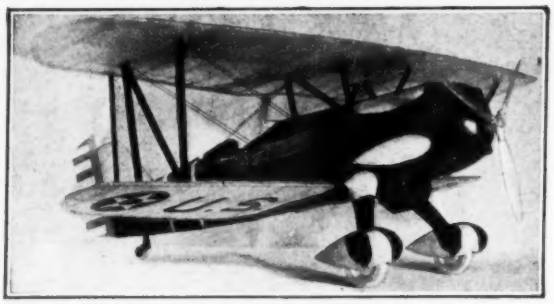
$2.00 in Canada. All other countries $2.50 per year.

CURTISS ARMY HAWK P6E



24" Span. Weight 2¼ oz. Flies 800 Feet

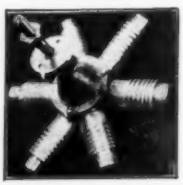
This new improved model of the P6E is the strongest and most perfect to be had; it is practically crash proof. Set includes: ribs, fuselage formers, radiator, wing tips, wheelpants, printed on balsa. Strong aluminum wheels, tail wheel, hollow metal exhaust pipes, wing, rudder, fuselage and U. S. Army insignia, printed instrument board, turned nose plug, formed prop shaft and motor hook, semi-scale fibre propeller, yellow and drab dope, glue, detail drawings with squadron design for fuselage and wheelpants. Set comes in colored labeled gift box. **Const. Set Compete, Postpaid** **$2.50**

5 Foot Curtiss Hawk P6E

ENLARGEMENT OF ABOVE MODEL

Specially designed for gas motor, air or rubber driven motors

The strongest, most compact, all purpose, large flying model ever designed. Const. Set contains all wing ribs, fuselage formers, etc., cut to size and notched ready for assembly. Special rubber tired wheels, hollow metal exhaust pipes, glue, olive and yellow dope. Silk covering, axles, 15" carved spruce special propeller and many other details. **Set, Complete, Postpaid** **$28.50**



6-Cylinder Model

Model Gasoline Motor

TO FLY ABOVE MODEL

Bore	Stroke	Height	Weight	R.P.M.
⅞"	1"	4¾"	8 oz.	4000

The lightest, strongest, most perfect model airplaine motor built, comes complete with gas tank, spark plug, coil, condenser, and 15" carved spruce propeller. Complete ready to run.

Curtiss Challenger Air Motor

Driving 18" prop motor delivers 1/6 H.P. at 1900 R.P.M. Will fly 5 to 8 foot scale models. Price Motor ready to run, $12.50. 3" x 24" Air Tank, $6.50.

New Curtiss XP934 Pursuit

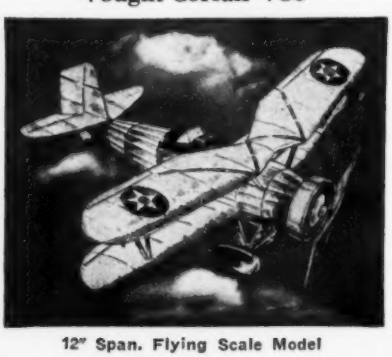
24" Span. Weight 1¾ oz. Flies 675 Feet

Set includes semi-finished wheel pants glistening hollow metal exhaust pipes, strong aluminum wheels, two color dopes, glue, wing and rudder insignia, U. S. army lettering, detail drawing, ribs, formers, etc., printed on balsa. **Const. Set Complete Postpaid** **$1.75**
12" SPAN CONST. SET..... .50

New Catalogue

All about the latest gas, air and steam motors and the finest scale flying models to be had. Send 10c coin.

Vought Corsair V80

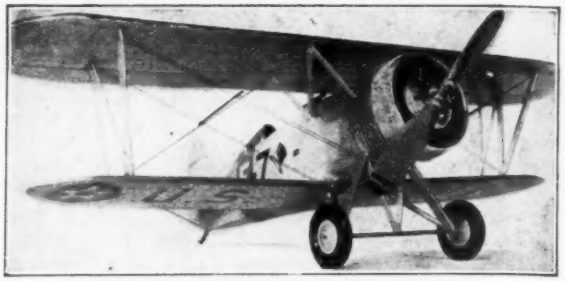


12" Span. Flying Scale Model

Set includes 1½" celluloid motor and cowl ring part printed on balsa, glue, dope, etc. Postpaid.... **.75**

CURTISS C-SWIFT MODEL shown at right is the new 250 M.P.H. Pursuit. Comes with 2" celluloid motor, cowl, and bearing, all parts printed on balsa, colored dopes, glue, drawing, etc. Set Postpaid .... **.75**

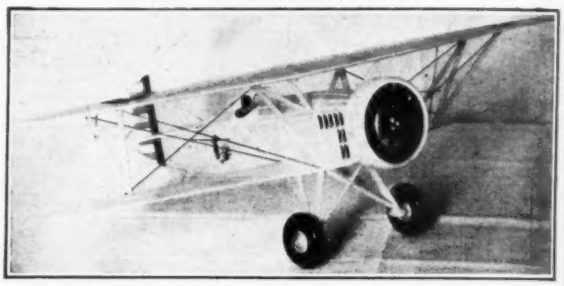
BOEING F4B4 NAVY FIGHTER



22½" Span. Weight 2¼ oz. Flies 750 Feet

A special detailed model of Boeing's latest pursuit. Construction Set includes fuselage formers, ribs printed on balsa, wing, fuselage and Navy insignia, printed instrument board, celluloid wheels with silver discs, silver and yellow dope, glue, drawing, 3" celluloid motor, aluminum motor plate and drag ring, tail wheel, flying wires, ready formed wire parts. This model is not only an excellent flyer but a beautiful show piece. Const. Set comes in colored label gift box. Postpaid **$2.95**

CURTISS SEA HAWK P3A



24" Span. Weight 2 oz. Flies 900 Feet. Color Silver

New redesigned model with all parts printed on balsa. A finely detailed model, practically crashproof. Set includes 3" celluloid motor, aluminum motor plate and drag ring, balloon celluloid wheels, printed instrument board, fuselage, wing and rudder insignia, aluminum pilot's seat, drawing, semi-scale fibre prop, scale aluminum machine gun, dope, glue. Set comes in colored labeled gift box Construction Set Complete, Postpaid **$2.75**

CURTISS SEA HAWK P3A SPECIAL

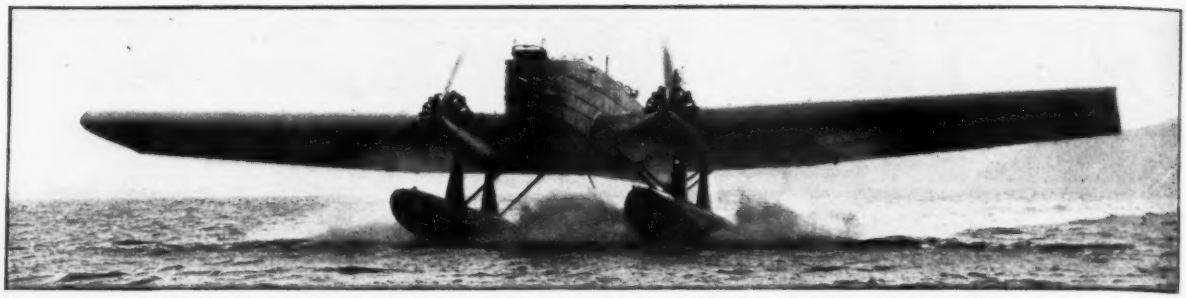
This is same set as above except that it has an exact scale 3¾" celluloid Cyclone 700 H. P. motor with aluminum push rods, etc., without cowl. **Const. Set complete postpaid** **$2.95**

CURTISS CYCLONE SWIFT

12" Span. Weight 1 oz. Flying Model
New Army Pursuit Model Latest Out

Miniature Aircraft Corp.

83 LOW TERRACE, NEW BRIGHTON **NEW YORK**



The S.P.C.A. T3-BN4, bomber-fighter, powered with two 480 h.p. Jupiters. The span is 85.31 feet

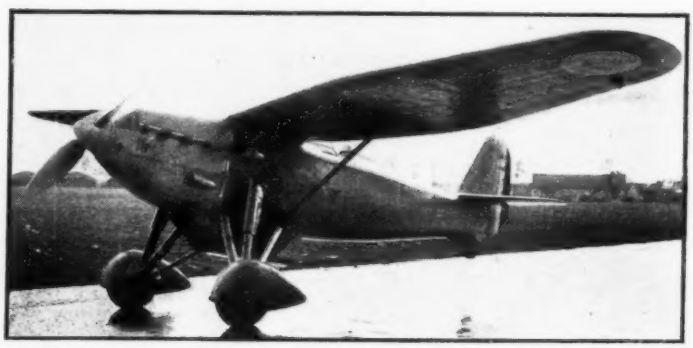
Is France Supreme in the Air?

How France Has Established Her Air Force as the Backbone of Defense Against the Menace of Invasion

By FLETCHER PRATT

IN AN inconspicuous corner of the newspapers last fall, was an item headed "Emerald Plane Crashes." A week or so later there was an even smaller item entitled "Cot Asks Bigger Air Budget." Behind those two items lies the story of a struggle all the more intense because it was carried on in silence, and all the more desperate because the enemy was an invisible one.

For the enemy was time and the prize of the silent struggle was the safety of the French nation. And it was not until a shining metal airplane swooped out of the clouds and trundled across the well-kept turf at Villacoublay a couple of months ago, that it was certain the struggle could be won.



The Mureaux 170-C1 pursuit, the pride of the French air force. Its speed is 232 m.p.h. with full military load

To understand about this struggle, you must go back to the Lockheed Vega. That ship, if you can remember that far back, was the first of the real high-speed transport buses. When her speed was announced as reaching the dizzy figure of 185 miles an hour, there were loud snickers from the direction of Paris. "Why, even our pursuit ships aren't that fast!" they said, Just another piece of Yankee bluff!" But a little later they were laughing out of the other side of their mouths, for Swissair bought a couple of those Yankee bluffs and they began to buzz about the European airways at 185 miles an hour—and better. And right on the heels of that performance, all the nations of Europe began to build high-speed weight-carriers that could be bombers.

Well, if the Americans could do it, so could the French. They went to work on it and in the middle of 1933 came to bat with the new craft. She was the Dewoitine Emerald, a beautiful, long, three-motored monoplane, which could carry three tons of passengers (or bombs if you prefer). On her first trip, she soared through the skies half-way round the earth, from Paris to Saigon, at a speed that was a world's record all the way. If the other nations of Europe had bombers that would escape French pursuit ships, France now had one that would beat theirs. The governor of Indo-China and half a dozen officials booked return passages in the new wonder machine, and everything was set for a triumphal reception at Le Bourget.

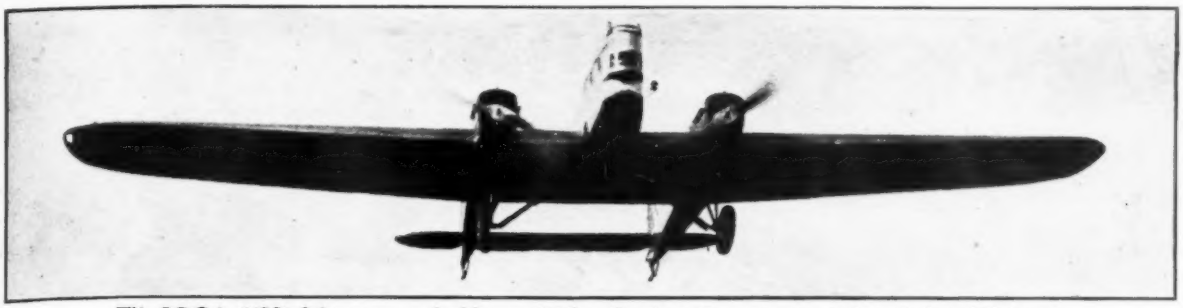
It never took place. Half-way home, the Emerald crashed in flames and every passenger in her was killed.

The French bomber had failed! Any nation with which France was at war could bomb her without fear of reprisal. To understand how the average Frenchman feels about attack from the air, you must realize that a squadron of bombers can take off from any one of five different countries in the afternoon and be over Paris by dark —and it is no secret that the "next war" will probably begin with just such a bombing raid before war is declared.

A shock of horror went through the country. Posters, printed and put up by unknown persons, appeared everywhere, with a picture of a mother clutching her child and looking up into the sky at an enormous airplane bomb—"ANY FACTORY CAN MAKE BOMBS THAT ANY AIRPLANE CAN DROP" they said. There was a Parliamentary commission of inquiry and a long series of conferences of the General Staff, in which the whole air policy of France was reviewed They decided that France's only hope of safety from aerial attack lay in making sure they could get these new fast bombers before they crossed the frontier into French territory. Which was not an easy job.

And so Pierre Cot, French Minister of the Air, asked for a larger budget, and the drafting rooms were filled with men in sky-blue uniforms running a feverish race against time—to build more and faster pursuit ships than the surrounding nations could build bombers, and to get them ready before a war should come. The French air service was reorganized into what it is today, the largest numerically, in the world, predominantly a service of lightning-fast pursuit ships and fighting reconnaissance machines that are the eyes for a wonderfully organized, anti-aircraft ar-

The Hanriot-Biche pursuit which makes 240 m.p.h. The "pusher" arrangement allows clear vision. Plans for this plane appear in this issue



The S.P.C.A. 30M4 fighter, powered with two 650 h.p. Loraines. Guns are mounted to eliminate blind spots

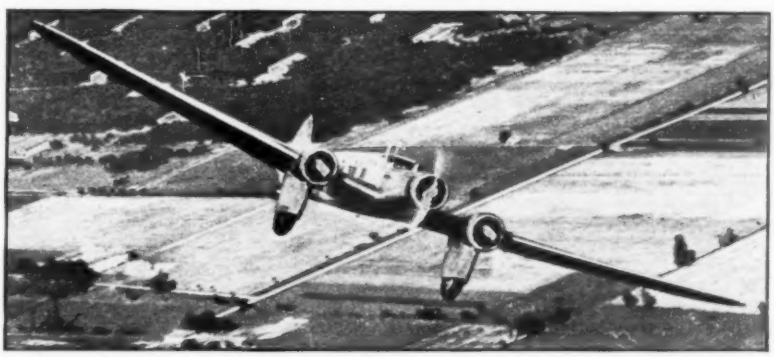
tillery corps. In bombers, the French aren't so good, but apparently they don't much care.

Before the big reorganization, the French pursuit ships were mostly of two types—the Morane and the Nieuport. The Morane was a high-wing monoplane regular "parasol," a direct descendant of the Western Front machines of 1915, with a radial air-cooled motor. Its top speed was around 190; a good, solid service machine, but nothing special. The Nieuport was an "interceptor," a type not found in most services; a sesquiplane with a top speed of only 165 miles an hour, but great climb; intended to take off when hostile bombers crossed the frontier and to get the invaders coming over. You can see for yourself what chance either of these would have with bombers that raced along at 185 miles an hour, especially in the night and protected by their own pursuit aviation.

The observation ships were Breguet, Bleriot and Potez types, two-seaters, with top speeds of around 145 miles an hour. The Breguet was a good type basically, slightly altered for the purpose. Machines of the same type had made several sensational flights across the Atlantic, the length of Africa and across Asia; but the service machines were much cluttered up with photographic equipment, extra radios and what have you. The Bombers can be discussed later; they haven't changed much.

The big change started on the ground. The General Staff decided that the A-A batteries which are a part of the great system of defensive fortresses France has been building along her frontiers ever since 1920, were all right; they only needed more help from the air and better organization. As part of this change the searchlight sections were taken away from the artillery and put under the air force, under the theory that the air force would be locating the enemy in the skies and would direct the lights where they wanted them. The artillery's only duty was to shoot at the targets the lights picked up.

The second step was to call for new designs all along the line. The pursuit ships would have to be made faster by some means. The best brains in France were invited to contribute ideas and the Bureau of Inventions threw all its resources into the task, exactly as though the emergency were one of a war in being.



The Dewoitine D332 transport or bomber. It is France's answer to our latest transports. Its span is 92 feet

Meanwhile, a series of maneuvers was carried out over Metz to determine the value of the interceptors and two-seaters. Planes flew in from the frontier to represent the enemy, while the gound services and observation machines tried to locate them and get interceptors into the air in time to meet them. The test showed conclusively that the Nieuports stood very little chance of intercepting anything except when the "enemy" was on his way home after having dumped his cargo of exploding eggs. This wouldn't do.

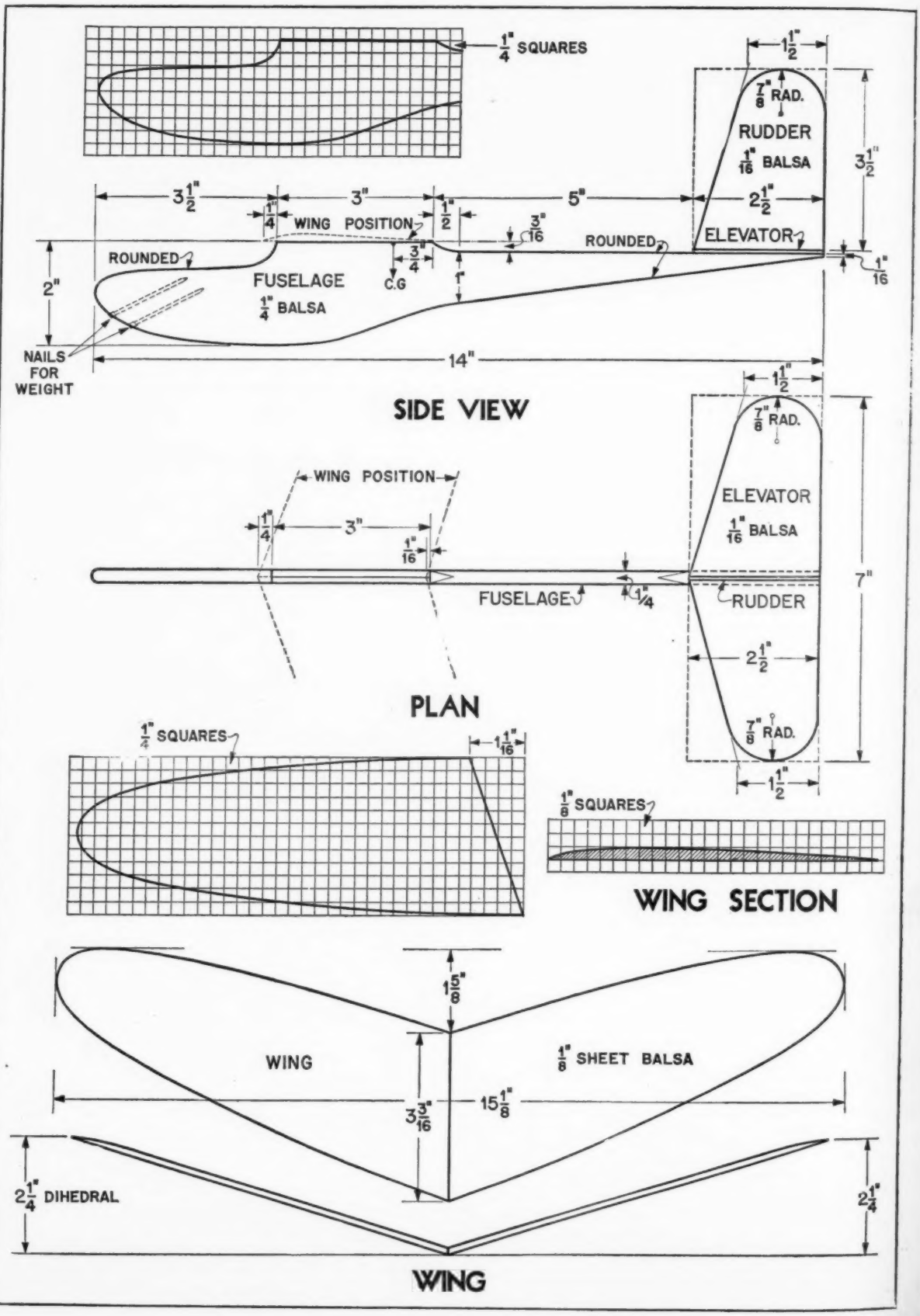
The policy on these machines was changed sharply as a result. Under the new dispensation, the observation machines themselves were to be the interceptors, several squadrons of them being kept in the air on patrol duty along the frontiers all the time. When enemy bombers appeared, they were to go for them right away—object, battle.

Now, to accomplish this meant an observation machine of great speed and gunpower that could stand up to a bomber in a fight and at the same time beat off the hostile pursuit that would be protecting the bombers—in other words, a fighter instead of an observation machine.

To get the speed, the Air Ministry decreed a merciless "cleaning up" of existing designs, a process hard to describe because it consisted mostly in giving the machines better curves, and suppressing parasite resistance. All external bracing wires were eliminated from the new types, an order that was hard on some manufacturers, including Louis Bleriot, one of the great pioneers of French aviation who had been supplying the French air service with Bleriots and Spads since before the war. "But I don't know how to make them without wires," he protested. "Isn't that too bad," said the Air Ministry and gave the orders to somebody else; and Bleriot is closing down his famous factory. Too bad, no doubt, but this was a question of national safety. Another example of the attention to detail is the tiny airfoil mounted just over the cockpit in the new Breguet fighter, to correct the insignificant break in the airflow caused by the cockpit opening. Another is the development of the "cork" rivet; a new type of headless rivet that took several thousand dollars to work out—even the rivet-heads figuring under head of unnecessary resistance.

(Cont. on page 36)

The Potez 37-R2 Reconnaisance fighter. It is one of the popular older ships. Its speed is 133 m.p.h.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1 1/2"
7/8" RAD.
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WING POSITION
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ELEVATOR
ROUNDED
ROUNDED
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FUSELAGE
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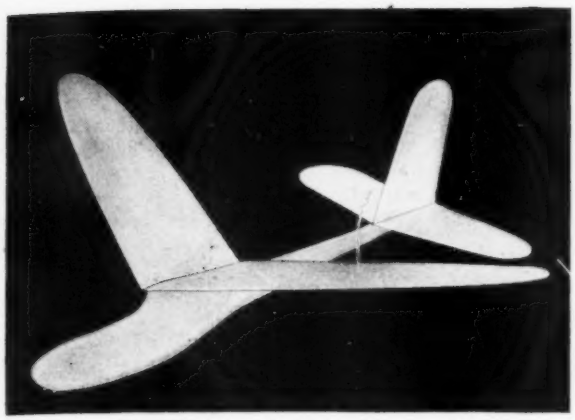
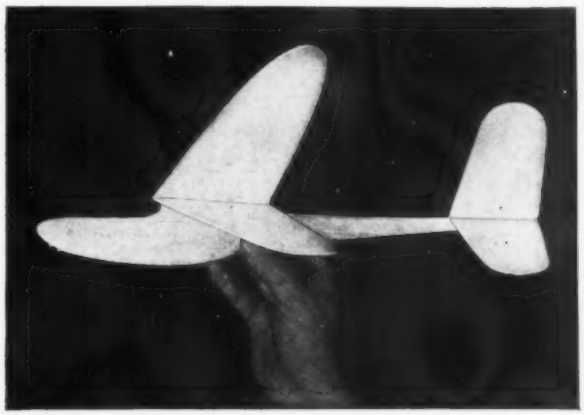
C.G
3/4"
1"
1/16"
NAILS FOR WEIGHT
14"
SIDE VIEW
1 1/2"
7/8" RAD.
WING POSITION
ELEVATOR
1/16" BALSA
1/4"
3"
1/16"
FUSELAGE
1/4"
RUDDER
7"
2 1/2"
7/8" RAD.
1 1/2"
PLAN
1/4" SQUARES
1 1/16"
1/8" SQUARES
WING SECTION
1 5/8"
WING
1/8" SHEET BALSA
3 3/16"
15 1/8"
2 1/4" DIHEDRAL
2 1/4"
WING



The dihedral and sweepback give stability



The finished glider ready to launch

Fundamentals of Model Airplane Building

A Complete Course for Beginners Who Wish to Become Expert. How to Build a Contest Glider—Part No. 3

By EDWIN T. HAMILTON

IN THIS article, we present the third and last "all balsa" glider which will appear in this course. It is a contest glider designed and perfected by your editor, Charles H. Grant. As this completes such instruction as will be given on this type of model, it may be helpful to quickly review the work covered so far.

In the opening article, an all balsa, stick glider of straight lines was given for obvious reasons. Its simplicity of line, together with its gliding ability, made it a perfect model through which to introduce the newcomer to the fun of model airplane building. In this first article, such steps as laying-out, cutting, sandpapering, cementing, general assembly and the reading of simple plans were covered. So much for stick, all-balsa gliders.

In the second article appearing last month, refinements were introduced into the glider design. A nacelle was added to the stick, squared corners were gracefully rounded, while the wing was given a dihedral angle. The cutting of curved sections, cementing the wing in dihedral position, reading and using graph plans, and shaping the nacelle were only a few of the advanced steps covered. So we now come to the contest—and last all-balsa—glider. Through it is brought to the reader his first fuselage, his first sweepback and tapered wing and a stationary tail unit, together with the art of launching a contest glider.

JUNIOR MODEL AIRPLANE BUILDERS CONTEST

Here is a chance to use your draftsmanship to advantage and win one of the five monthly awards. This is all you have to do to enter the contest:

Build the model described in each one of these monthly articles. Photograph it or have it photographed and send the photographic prints to the Editor, Universal Model Airplane News, with a written description of what you thought the most difficult operation in the building of the model was and how you overcame it.

This contest will run for five months. It will begin with the model appearing in the May issue and will end with the model appearing in the September issue of this magazine.

The five best sets of photographs and discussion of each model will be chosen by the judges from those submitted and an award of five dollars will be paid to each one of the contestants for each winning entry that they submit.

The winning entries will be selected on the following basis:

Accuracy and neatness of the model as judged from the photograph, the quality of the photograph itself, and the comprehensiveness of the discussion and the neatness of presentation of the entry.

Those who will act as judges are: Mr. George C. Johnson, publisher; Mr. Edwin T. Hamilton, author; and Mr. Charles H. Grant, editor.

Plans and instructions for building three models have been published. The first one was in our May issue, the second in our June issue and the third in this issue of Universal Model Airplane News.

Get busy on the first model now, for all entries for model No. 1 must reach this office by Thursday, June 29, 1934. Entries for model No. 2 must be received at this office before midnight of Monday, July 16. Entries for model No. 3, appearing in this issue, must reach this office before midnight of Wednesday, August 1.

No entrant will be eligible for an award unless he truthfully states he has built the model himself and gives his correct age and address. Give this information at the end of your discussions and have your parent or guardian sign it as a witness.

This may be the start of your career in aviation. Get busy now. Send all entries to Charles H. Grant, editor, Universal Model Airplane News, 551 Fifth Avenue, New York City.

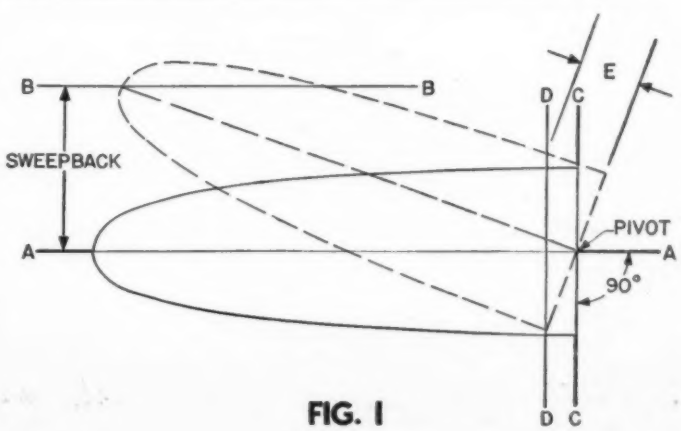


FIG. 1

At the same time, we introduce another addition to these articles. This will be an exhaustive, comprehensive and complete model airplane glossary of terms. This feature will appear at the end of each article. It will consist of understandable definitions of all aeronautical or model words used in the article it covers. In this way, the new builder will soon have a model airplane and aeronautical vocabulary second to none.

Fuselage

Turn to the plan and carefully study the fuselage, as shown under "Side View" and "Plan." In the former view, the side of the fuselage is shown, while a top view is seen under the latter. Obtain a piece of light balsa wood measuring at least ¼" thick 2¼" wide and 14¼" long. This piece will allow a ¼" surplus for waste on the width and length.

Study the graph plan shown just above the fuselage. Rule a sheet of paper with ¼" squares, and then make a full-size copy of the front part of the fuselage on it. As this must be done free-hand, the squares are given to aid in the work. When copying the plan, make sure that the line you are drawing on your ruled paper passes through each square in exactly the same location as the corresponding line passes through the squares of the graph plan.

Take the piece of balsa and sandpaper one edge perfectly straight and parallel with the grain of the wood. This is called a "working edge" and in

FIG. 3

this case will become the top of the fuselage. Lay a piece of carbon paper on the wood with the full-size copy over it. Bring the straight top edge of the pattern flush with the straight edge of the wood and at the same time, see that the nose of the pattern is within ⅛" of the edge of the piece of wood. When in this position, trace over the lines of the pattern with a sharp pencil. Remove the pattern and go over the lines with the pencil to make them stand out clearly. Do not press too hard with the pencil as the wood may become marred should the pencil slip.

Measure 3/16" down from the straight edge of the wood and draw a line along its length. If the tracing has been correctly made, this line will meet the upper right end of the pattern outline. Measure along this top line 7" from the end of the pattern line, which will be the trailing, or rear end of the fuselage. This line is the straight upper edge of the fuselage. The bottom edge extends from the lower end of the pattern line out to a point 1/16" under the end point of the fuselage. When these lines have been drawn, the fuselage is cut out in the usual manner. For instructions on this work, see June issue, page 9, Fig. 1.

Both sides of this fuselage piece should be carefully sandpapered smooth and all edges rounded except those holding the wing and elevator. These must be left perfectly flat. Note their position in the side view under "Wing Position" and "Elevator." We are now ready to cut, shape and sand the elevator.

Elevator

The elevator is shaped from a piece of light sheet balsa wood measuring 1/16" thick, 2½" wide and 7" long, as shown by the dotted lines in the plan under "Elevator." Sandpaper one edge straight to serve as the working edge. Sandpaper the opposite edge parallel with the first. Find the exact center of the wood by measuring 3½" from either end and draw a line at right angles to the long side edges. Square up both ends. See that they form right angles with the side edges. Measure 1½" from one side edge at both ends and draw lines from these points to a center point on the opposite side edge. Cut the elevator to the shape shown in the plan with ⅞" radius ends. Complete it by sandpapering both sides and slightly rounding all edges.

Rudder

This requires a piece of light sheet balsa measuring 1/16" thick, 2½" wide and 3½" long. A back or trailing edge of the rudder and one end are sandpapered smooth, straight and at right angles to each other. The opposite end is rounded with a ⅞" radius circle, as shown in the "Side View" under "Rudder" of the plans.

Shape the rudder, as was done with the elevator, slightly round all edges except the straight end, and then sand both sides smooth.

Wing

The wing used on this glider tapers in width and thickness from its center toward its tips. It is made in two duplicate parts. To simplify the work of the builder, instead of giving a dimension for its sweepback, half the wing is shown on a graph, which includes the necessary slant for the sweepback. A full-size copy of the graph plan is drawn on paper ruled with ¼" squares, as shown in the plan under "Wing." The two halves are cut from a piece of very light balsa measuring ⅛" thick, 3" wide and 16½" long.

The longest edge of a sweepback wing is always the leading edge. It will be noted that while this edge on each half is nearly 8¾" long, the sheet balsa piece from which both halves are cut need be only 16½" long. This is because of the slant of the inner straight end of each half, which forms the center dividing line of the wing.

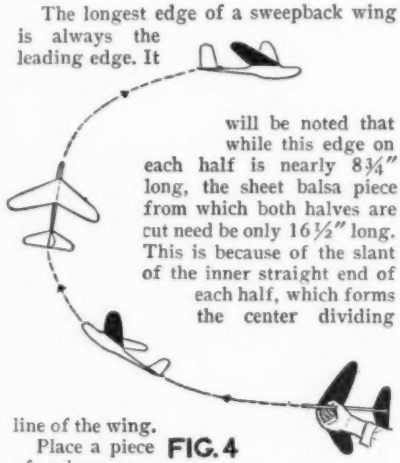


FIG. 4

Place a piece of carbon paper on the balsa sheet with the pattern of the wing half over it. See that the wing tip of the pattern is at the end of the wood when making the tracing. The second half is now traced by turning the pattern around until the short or trailing edge, of the wing half just traced, continues into the long edge of the wing on the pattern. At the same time, the leading edge of the traced wing must continue into the trailing edge of the wing on the pattern. The straight inner end of the pattern wing must be directly over the inner end of the tracing.

This process is quite correct when the slant of the inner end is given, as in this case, but when only a dimension is given, another method must be used. For example, let us say that the wing has a 2" sweepback. Half of the wing is cut out, as in Fig. 1. As no slant has been specified for the inner end of the wing, this must be cut square or at right angles to a line drawn through the center of the half wing along its length. Let us say that the half wing is 3" wide and 9" long. Measuring 1½" from either edge at the inner end or center of the entire wing, make a mark. Slide your rule to a point further toward the tip, find the exact center and mark. Draw a line through these two marks, which will split the wing along its center.

Draw a straight line on a piece of paper at least 10" long, as shown in Fig. 1 by "A-A." Draw another straight line at right angles to line "A-A" and passing through it, as shown by "C-C" line. The line "B-B" is drawn 2" above "A-A" and parallel to it, which represents the called-for sweepback of the wing.

Place the wing half on line "A-A" so that the line drawn along its length is directly over the line "A-A," as shown by the solid lines of the illustration. At the same time, see that the inner straight end of the wing half is directly over line "C-C." At the point where "A-A" and "C-C" cross, the wing half is pivoted until the end of its center line touches line "B-B." When in this position, as shown by the dotted lines in the illustration, the line "D-D" is drawn. This must be parallel to "C-C" and pass through the corner formed by the inner end of the leading edge and the straight inner end of the wing half. The wing must be cut along this line to form the proper slant for a 2" sweepback. In other words, the distance "E" is removed from the trailing edge, shorter than the leading edge by the distance "E." In our model here, the distance "E" equals 1-1/16", as shown in the graph plan.

The two wing halves are now cut out in the usual manner. The sweepback and taper along the width of the wing has been taken care of through this layout and cutting. The taper in thickness must now be dealt with. This is shown in Fig. 2. The form of the wing is shown in the plans under "Wing Section." Sandpaper must be used to gain this form. Fig. 2 shows several sections of the wing, cut as cross-sections, to enable the reader to picture how his wing should be formed. Note that the thickness of each half slowly decreases as it nears the tip. When doing this work, start sanding at the inner end of each half and work out toward the tip.

When completed, the two halves are cemented together with a 2¼" dihedral, as was explained in the June issue, Page 9, (see Fig. 3). When making this joint, lift one tip 4½" off level, while the other is held at level.

Assembly

Cement the elevator in position on the fuselage, as shown in the "Plan View" of the plans. See that its top is at right angles to the side of the fuselage and its trailing edge is at right angles to the edge of the fuselage.

(Continued on page 44)

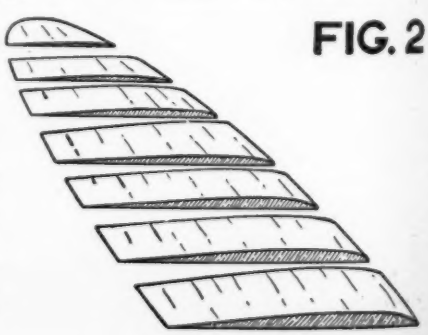
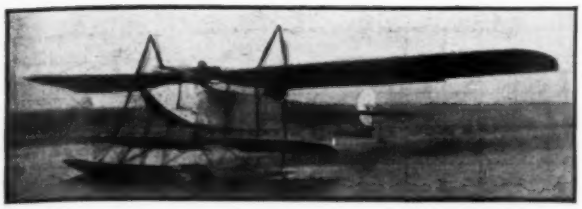
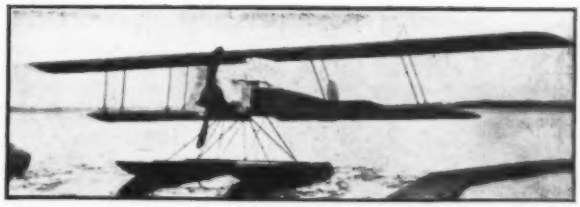


FIG. 2



The Fokker W.II, a tractor version of the W.I. It met with little success as it was ungainly and underpowered



The W.IV, built on lines similar to the 1913 short "Folder" seaplanes. It performed well with a 110 h.p. motor

The Development of the Fokker Fighters

Some Little Known Facts About Fokker's Adventures During the War in the Field of Seaplane Design. Published Here for the First Time

By ROBERT C. HARE

Part No. 9

AT ONE time or another, every aircraft manufacturer has taken a hand at building seaplanes. Friedrichshafen, Gotha, Albatros and AGO seaplanes patrolled the North Sea while their landplane cousins cruised over the Western Front. Allied pilots moored Short, Sopwith, Farman, and F.B.A. seaplanes and flying boats to their bases.

Fokker, too, tried his hand at the seaplane business, his first effort dating back to 1913. However, this might have been expected of Fokker because he is an ardent yachtsman, and at several distinct times engaged in boat building, from small canoes to small private cruisers.

Fokker's first flying boat, the W.I., powered with a 100 h.p. "V" type Renault. It crashed on its first flight

Thus, when in 1913, the Monaco Speedboat Race Committee announced that competition would be open to manufacturers of seaplanes, Fokker decided this would be a good chance to get a name for himself, if he won.

You will remember that at this date, Fokker was having a rather hard time of it as far as finances were concerned. The first prize of 100,000 francs would come in handy he thought. At the same time, his winning would put him down as a very competent aeroplane manufacturer, since his entry was to compete with products of long established firms of the calibre of Farman, Short and Voisin.

Construction was begun immediately after details of the race had been secured, and the Fokker hangar at Berlin-Johannistahl began to buzz with activity. Large sheets of the best plywood began to arrive, while lengths of selected spruce and ash woods made their appearance. A pusher propeller arrived from the Garuda works and a large shipping crate from Paris contained a brand new Renault 12 cylinder "V" type motor of 100 h.p.

It wasn't long before the hull and keel were laid and the bulkheads fitted in their proper places. The sheets of plywood were cut to proper pattern and nailed and glued to the skeleton. In the bow of the hull, a large space was left open for the pilot and mechanic. Just behind the cockpits, the front pair of struts supporting the motor mount, found anchorage in the hull. A few feet aft were the rear motor mount struts. From this point the hull tapered in plan view to finish in typical speedboat manner at the rear.

The 1913 Fokker seaplane, W.I by factory designation, was in reality a sesquiplane flying boat. The prefix W probably meant "Wasserflugzeug," or water flying machine. The lower wing was built in one piece, with the portion directly over the hull left uncovered. At this central point the spars and inner bracings were left exposed.

Each half of the lower wing consisted of nine ribs mounted on two main spars. Leading and trailing edges were of plywood and strip ash or spruce, respectively. The third rib from the tip on either panel was re-enforced to carry the correct strut fittings and wire terminals. The lower surface of each panel was equipped with a small but buoyant plywood float to keep the wings out of the water. The lower plane had neither sweepback nor dihedral.

In the upper plane, each panel was made up of 14 ribs mounted on the usual two main spars. Of the 28 ribs in the upper plane, the ten closest to the wing tip were spaced about 16 inches apart while the four inner ribs of each panel were nearly ten inches apart.

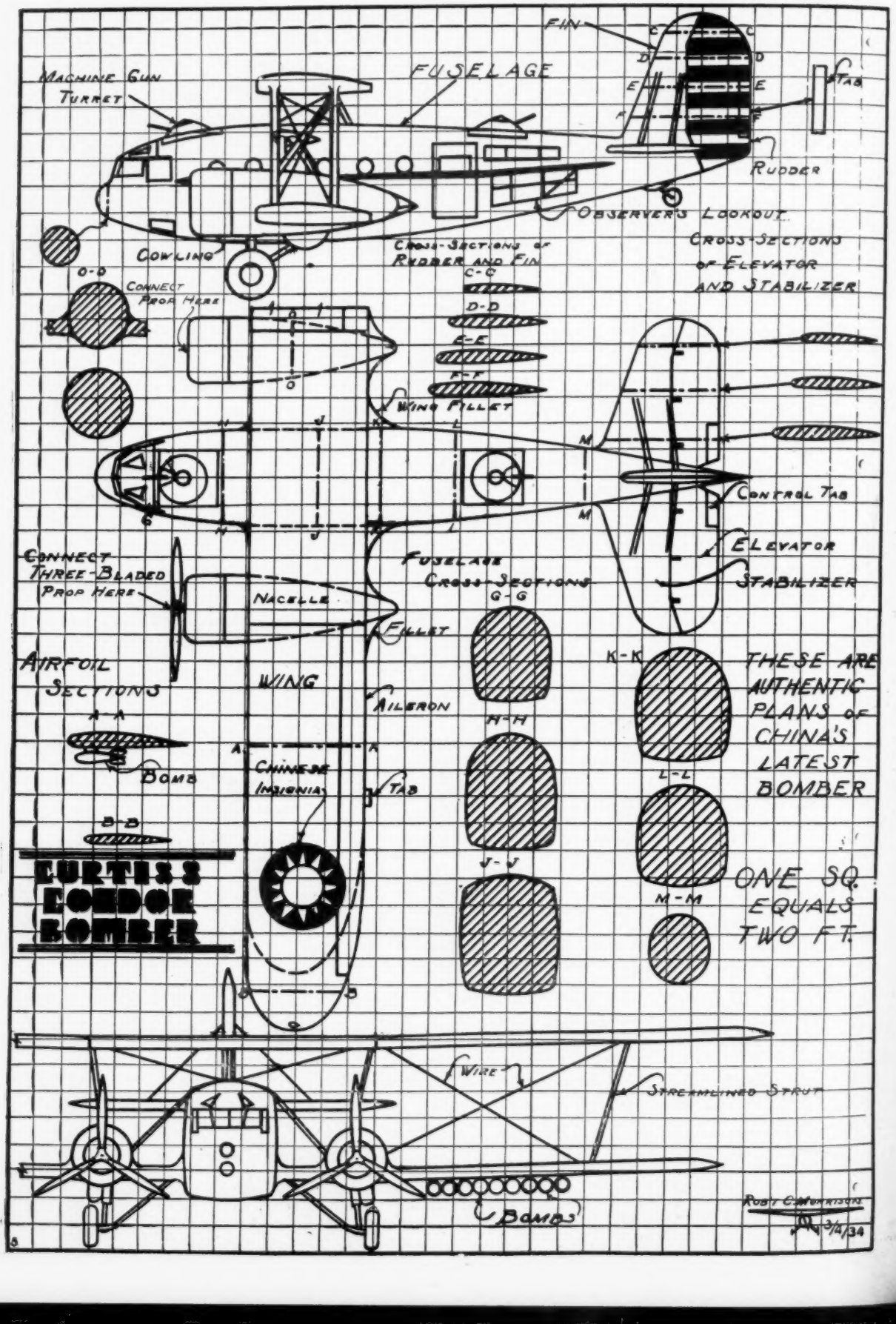
Each upper panel was attached directly to a center section which served the purpose of motor mount as well. Of the four struts of this member already described, the motor was mounted directly between the rear pair. In front of the motor, attached to the two main spars, a padded mount carried the streamlined gasoline tank. The upper plane carried all the dihedral angle. The old wing warp control was then in use and applied to the W.I for lateral control.

Due to the fact that two-thirds of the upper wing span was overhang, that was not supported directly by struts, two upper surface cabanes were employed in each panel. These "V" shaped structures were attached to fittings in the compression member of the upper wing, to which the interplane struts were also connected. From this superstructure, overhang brace wires led to the wing tips where they terminated in anchorage fittings. Interplane bracing was entirely conventional with the exception of the wing-warp cables which ran directly from the control column to the wing surface.

On a superstructure at the tail end of the hull, a light superstructure carried the empennage safely out of the water, in the manner later applied to some models of the F.B.A. and Nieuport-Macchi flying boats. The horizontal surface was made up of a small stabilizer and a rather large (in proportion) elevator. In order to provide sufficient rudder surface, a divided rudder was employed, half above the elevator and half below. The lower half was used as a fin and was stationary, while the upper half, actually rudder, was of the balanced type. In shape, this upper rudder was strangely reminiscent of the rudder on the Fokker M.2 described some time ago.

Up to this point, the Fokker W.I is a good example of flying boat construction, logically designed and well built. However, the W.I flew very poorly. Had there been time to re-build the W.I after it was

(Continued on page 40)


FIN
FUSELAGE
MACHINE GUN TURRET
TAB
RUDDER
OBSERVER'S LOOKOUT
COWLING
CROSS-SECTIONS OF RUDDER AND FIN
CROSS-SECTIONS OF ELEVATOR AND STABILIZER
C-C
D-D
E-E
F-F
CONNECT PROP HERE
WING FILLET
CONTROL TAB
ELEVATOR
STABILIZER
CONNECT THREE-BLADED PROP HERE
NACELLE
FUSELAGE CROSS-SECTIONS
G-G
FILLET
K-K
THESE ARE AUTHENTIC PLANS OF CHINA'S LATEST BOMBER
AIRFOIL SECTIONS
WING
AILERON
H-H
BOMB
CHINESE INSIGNIA
TAB
L-L
B-B
CURTISS CONDOR BOMBER
J-J
M-M
ONE SQ. EQUALS TWO FT.
WIRE
STREAMLINED STRUT
BOMBS
ROBT C. MORRISON
3/4/34

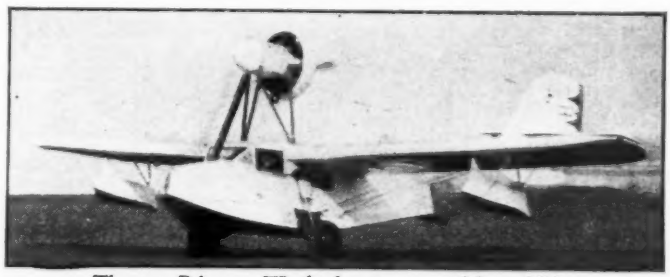
The Curtiss Condor Bomber which has a span of 82 feet and carries 2400 lbs. of bombs. Its speed is 175 m.p.h.

On the Frontiers of Aviation

Intimate Details of the Latest American Airplanes and How You Can Build Solid Scale Models of the Curtiss Condor Bomber and the Grumman Fighter

By ROBERT C. MORRISON

THE appearance of pioneer airplane manufacturers, "hit" by the depression, once more in active operation is a good sign that the aviation industry is not far from normal prosperity. Though Harold Pitcairn, autogyro manufacturer and originator of the famous Pitcairn "Mailwing," has ceased operations at his plant, Cessna, Swallow, Driggs, New Standard, Harper (formerly Argo), and others have once more entered into active business. Cessna is building a plane capable of a top speed of 170 m.p.h. with a 145 horse-power Warner engine. The ship, slightly larger than the former four-place Cessna, will have wing flaps on its single high wing.



The new Privateer III, the latest commercial amphibian

The Swallow Airplane Company is building a new two-place, side-by-side, high-wing monoplane, to be completed by this summer. Incidentally, the Swallow Airplane Company is the manufacturer of America's first commercial airplane. They are operating in Wichita, Kansas, as is the Cessna concern.

Details of the Driggs plane are not obtainable at the present time. The Driggs people were the former builders of the famous "Skylark."

New Standard is producing the same planes as formerly, no new designs having been announced.

The Harper Company intends to build one plane a week, a newly designed sport plane.

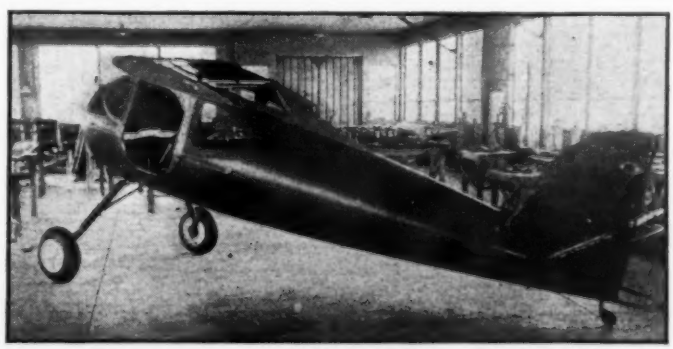
Among new military planes are two pursuits, each with retractable landing gears. One is a high-speed Boeing with an enclosed cockpit; the other a Curtiss Hawk, known as the F11C-3. The Hawk has a landing gear and fuselage similar in design to the Grumman FF-1, described later in this issue. Other features of the Curtiss Pursuit are identical to those of the F11C-2, now very popular among model builders. These two pursuits and the new low-wing pursuit put out by Consolidated are the first of that type to have retractable landing gears.

The consolidated Aircraft Corporation of Buffalo, New York, has designed an attack plane very similar to their pursuit described in last month's "UNIVERSAL MODEL AIRPLANE NEWS." One of their naval light bombing planes is now undergoing tests for the U. S. Naval Air Services. It is a two-place tapered wing biplane of excellent design.

The Vultee V-1, which made its debut early last year and then nothing more was heard about it, is once more in the limelight. American Airways (now to be known as American Airlines), has ordered ten of the V-1s along with ten more Curtiss Condors and ten Douglas low-wing transports. It has not been made known yet if there have been any radical changes in the Vultee. After its first test flights last year, it was announced that only a few changes would have to be made in its design. The ship is a low-wing, high-speed transport.

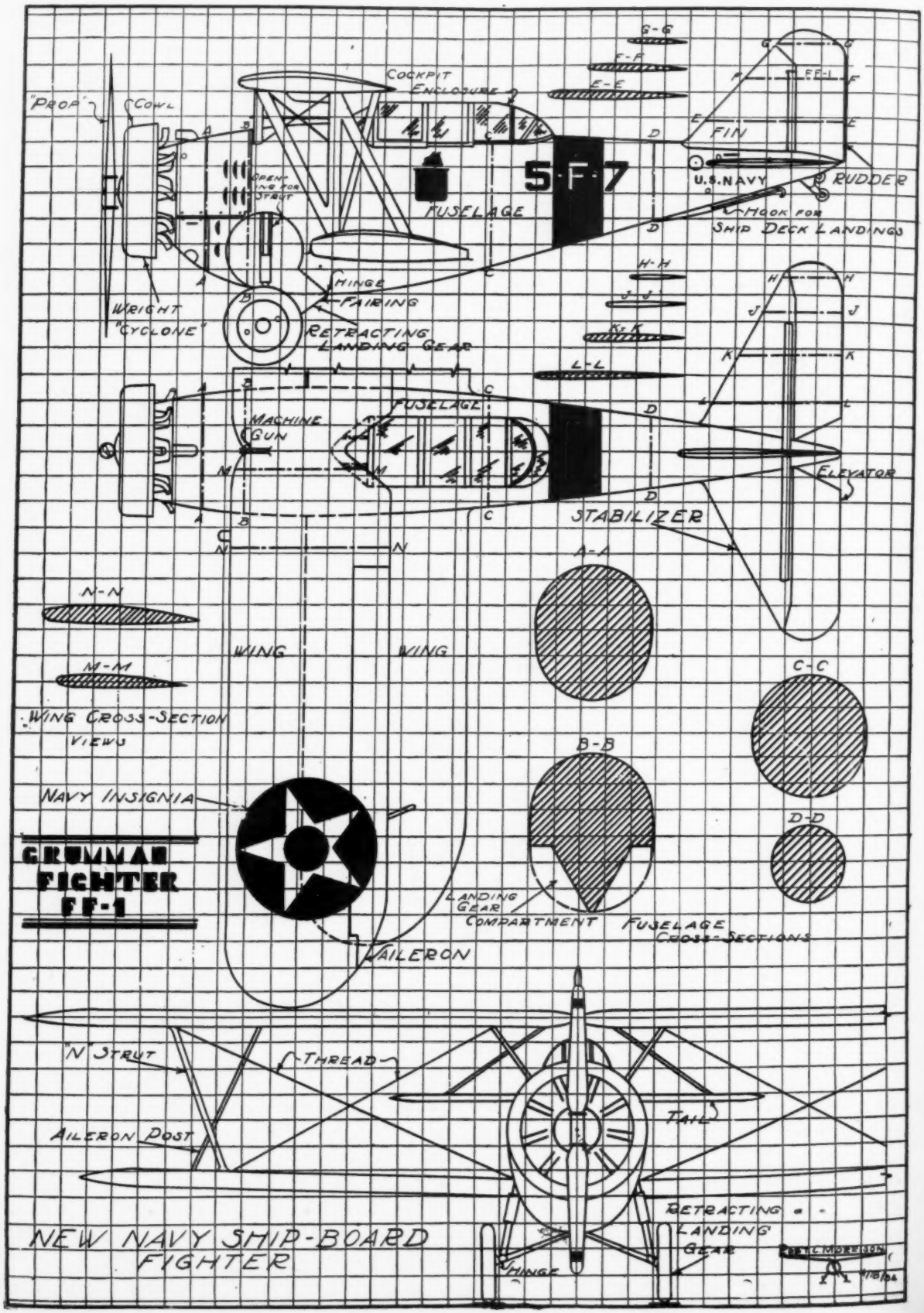
American Airlines' new Condors will be different from former 1933 Condor transports. They will have longer motor nacelles and newly designed cowls like those now used on the Curtiss Condor bombers built for China.

Several years ago Allan Lockheed, originator of the "Vega," "Altair," "Sirius" and "Orion," built a twin-engined monoplane known as the "Alcor." Its two Menasco engines were laid horizontally side-by-side in a nacelle which faired into the monocoque fuselage. Nothing more was heard about the "Alcor" until lately when another one was built, and successfully test flown. The "Alcor" will be used for feeder-line work.



The metal monocoque fuselage of the Luscombe monoplane

Another ship built for the same purpose is the new Stinson Model A, tri-engined, low-wing transport. Now that the long trunk lines have been well established, there will be


"PROP"
COWL
COCKPIT ENCLOSURE
OPENING FOR STRUT
WRIGHT "CYCLONE"
HINGE FAIRING
RETRACTING LANDING GEAR
FUSELAGE
MACHINE GUN
STABILIZER
ELEVATOR
FIN
RUDDER
U.S.NAVY
HOOK FOR SHIP DECK LANDINGS
SF-7
G-G
F-F
E-E
H-H
J-J
K-K
L-L
N-N
M-M
A-A
B-B
C-C
D-D
WING
WING
WING CROSS-SECTION VIEWS
NAVY INSIGNIA
GRUMMAN FIGHTER FF-1
LANDING GEAR COMPARTMENT
FUSELAGE CROSS-SECTIONS
AILERON
"N" STRUT
THREAD
AILERON POST
TAIL
RETRACTING LANDING GEAR
HINGE
NEW NAVY SHIP-BOARD FIGHTER

many short-haul lines established to "feed" the large lines. Thus, there will be the demand for a new type of plane such as the Stinson, capable of landing in small areas with heavy loads, and having high cruising and maximum speeds. Specifications of the new Model A Stinson are as follows:

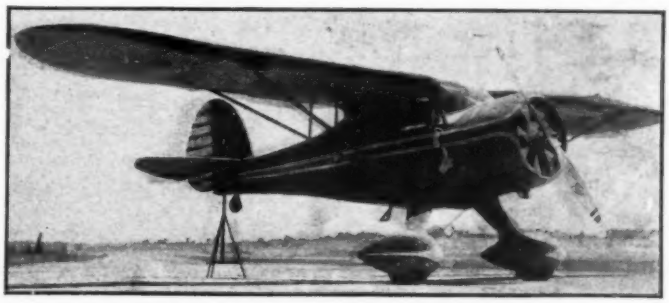
Wing span ....60′
Length ....36′ 10″
Height (including radio mast) 14′ 2″
Power total .720 h.p.
Capacity .....10 place
Useful load .....3080 lbs.
Pay load .....1860 lbs.
Cruising speed at 5000′ .150 m.p.h.
Cruising speed at 1000′ .146 m.p.h.
Climb at sea level ..1060 ft. per min.
Range with 35% excess fuel 370 mi.

A new 145 horse-power Warner Monocoupe is now on the market. Following the trends of modern design, wing fillets have been incorporated into its lines. A new, well streamlined landing gear and new cowl add to the beauty of the ship. Top speed is calculated at 165 m.p.h., cruising speed at 140, and landing speed at 50 m.p.h. Wing span is 32 feet.

Another plane, very much like the Monocoupe, and as a matter of fact designed by the designer of the Monocoupe, is the new Luscombe sport plane. Don A. Luscombe is now in business for himself in Kansas City, Missouri and expects to have the first of his new planes completed soon. A three-view of the ship is included in this article. The plane is a two-place, high performance (175 m.p.h. high speed, 150 cruising) cabin monoplane powered by the Warner Super-Scarab. The ideas and demands of the private flyer of the last eight years are combined in the plane to set a standard in design unlikely to be equalled for several years to come. The fuselage is of metal monocoque construction. Spars and ribs are also of metal.

Such comforts as two wide, unobstructed doors, automobile type seats, 42 inch width, provision for either seat or back type parachutes, and large accessible luggage compartment, are present in the plane. There is excellent visibility.

On the landing gear, the use of streamlined tires gives less frontal area on top and bottom. "Pants" or "cuffs" are needed then only to correct the leading edge and this tire streamlining becomes very small and light, and since they are left open at the top, they are virtually non-fouling in mud and slush.



The D.145 Monocoupe. It has many refinements

An electric motor controls wing flaps, which give the plane a landing speed of 45 m.p.h. A radio will be installed in the planes.

Amphibions Inc. has put a new Privateer amphibion on the market.

Fairchild has also completed a new F-24 cabin monoplane powered by a Warner 145. Top speed is 145 m.p.h., cruising speed 126 m.p.h., landing speed 45 m.p.h.

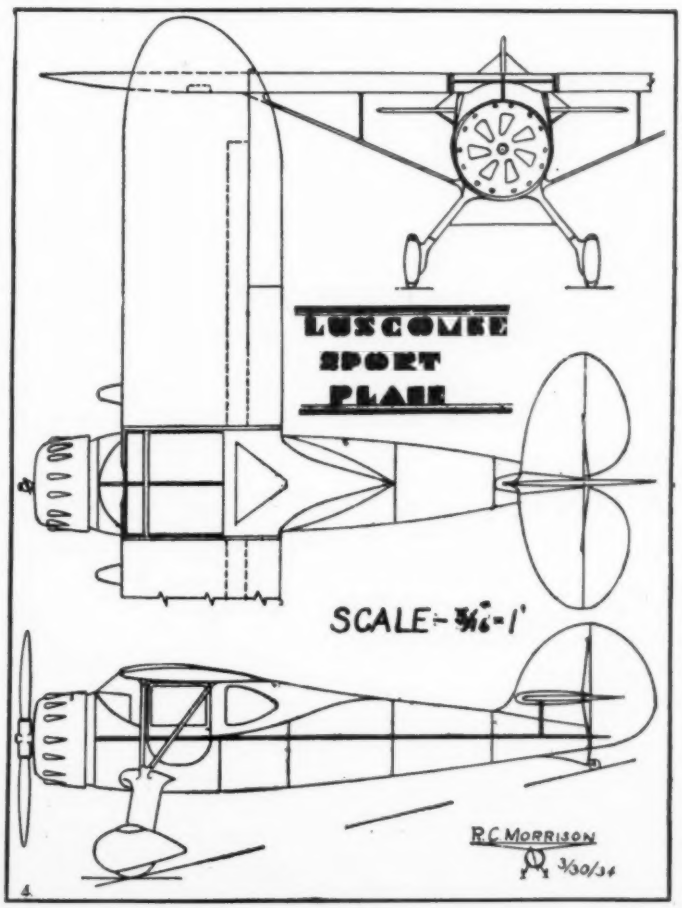
The giant Sikorsky is the most outstanding development in recent years. Detailed model plans are being drawn up at this writing and will be included in next month's article in "UNIVERSAL MODEL AIRPLANE NEWS."

One of the latest of foreign planes is the four-engined De Havilland Gypsy-powered airliner built for Imperial Airways. High speed is 170 m.p.h., and cruising speed is 145 m.p.h. Another new D.H. ship has been constructed which will probably be used in the London-Melbourne race The pilot's cockpit is in the rear of the fuselage near the tail; a practice employed on the Gee Bee Super-Sportsters. Its speed is about 200 m.p.h.

The Kinner Airplane & Motor Corp., Ltd., has announced the production of a new four-place cabin, low-wing monoplane, similar to the Play Boy.

The Boeing Airplane Company of Seattle, Washington, has just completed their latest transport, the 247D and is working on several new designs at the present time.

Northrop has gotten out another new military ship for the U. S. Navy. Its speed is estimated at 300 m.p.h! It is the fastest pursuit plane in the world! Like other Northrops, the plane is a low-wing, but of much smaller wingspread than the Army Northrop attack. The power plant is one of the new 14-cylinder Wright engines.



Another new four-engined transport put out by England is the giant landplane designed after the Short four-engined flying boats.

The above is a description in brief of many of the outstanding planes recently produced which should appeal to the model builder. All the planes possess fascinating and interesting lines not present in the older types. From a survey of over two hundred model companies, the model industry is sadly far behind in the production of up-to-date models! Let us keep pace with the great strides being made by our aircraft manufacturers.

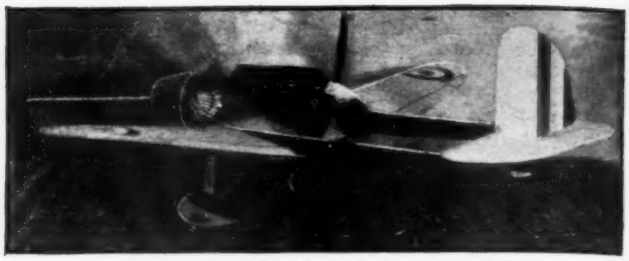
It is the main purpose of these articles to stimulate the building of more modern models.

The Curtiss-Wright BT-32 Condor Bomber

The giant biplane which weighs 17,500 pounds and has a wing span of 82 feet, is a combination ambulance-transport-bomber. As a bomber, it is capable of carrying 2400 pounds of bombs at a speed of 175 m.p.h. Its excellent performance is indicated by the fact that it takes off

(Continued on page 32)

Building the Hanriot-Biche Pursuit



The completed Hanriot-Biche Pursuit model

Complete Plans and Instructions to Build One of the Most Unusual Modern French Pursuit Planes

By ELMER PILZER

ONE of the most unique products of France's new "air" policy is the new Hanriot-Biche, low-wing pursuit plane. Unlike other planes in its class, it is a pusher, powered with a geared and supercharged 600 h.p. Hispano Suiza engine. As it is water-cooled, a ring type radiator is used. This is mounted on the nose of the nacelle and enclosed with an N.A.C.A. cowling. A unique feature is the location of the two gas tanks in the center section of the wing. In case of an emergency, both tanks may be dropped free of the plane.

The all-metal propeller has three blades which can be adjusted to any pitch during flight. The twin machine-guns that are of Chatellerault make, fire through the bottom of the cowl. All controls are of push pull rods. The controls for the tail pass through the tail booms on ball bearings.

Data on the performance and top speed of the Hanriot-Biche has been kept secret by the government, but it is understood that it has made a speed of 240 m.p.h. It is secretly planned to have the entire landing gear retract up into the wing.

You should have some interesting moments while building and flying this model. Study the plans and follow the instructions closely before you start.

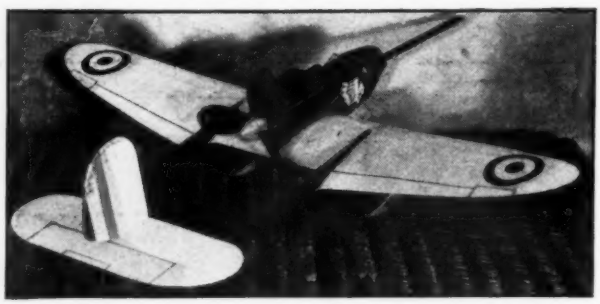
Wings

Before starting to build, first trace the drawing of the left wing on a sheet of transparent paper. Then, by turning the transparent paper over on the opposite side, the right hand wing will show through the paper. Proceed by tracing and cutting out all the ribs of 1-16″ sheet balsa. Note: All tracing is done with carbon paper and all patterns are cut from thin cardboard.

Some model builders will not go to the trouble of cutting out the lightening holes for the ribs, but those that will, may burn the holes out with some round tool that can be heated over a flame. I've found that a large nail punch is very handy in burning out the holes.

You may now start the wing by pinning the lower leading spar on top of the plans, which should already be covered with transparent wax paper. Ribs No. 2 and 6 are now pinned and cemented in place. Now taper the leading edges into the correct shape and pin them and the trailing edges down on top of the drawing. They are then lifted up until they are even with the front and rear of the ribs. Then continue to cement all the remaining ribs in their respective places. While this is drying, boil two pieces of 1/32″ x 1/16″ bamboo and pin them around for the wing tips. Now cement in the remaining spars and proceed to build the center section wing in the same manner.

After the wings are left to dry over night, remove them from the plans and sandpaper the leading and trailing edges into the correct shape. Then cut off all the obstacles that may project through the covering and sandpaper the entire three parts of the wing.



The pusher propeller makes it an interesting model to fly

Tail Surfaces and Booms

Make two booms alike according to plans. These are cut from ¼″ sheet balsa. Horizontal tail is made by first pinning a piece of 1/16″ square bamboo across the length and two pieces of 1/16″ x ⅛″ balsa for the leading and trailing edges. Then trace and cut out the rounded tips of the tail, of 1/16″ sheet balsa. Finish by cementing in the rest of the frame of 1/16″ square balsa. Vertical tail is built likewise. Both surfaces should be left to dry over night. By doing this, you prevent the tails from warping. When dry, sandpaper both tails and place a heavy book on them to keep them flat until ready for assembly.

Fuselage and Propeller

The body and propeller appear very difficult to carve, but with a little patience and skill, you will find that it is not as arduous as it seems.

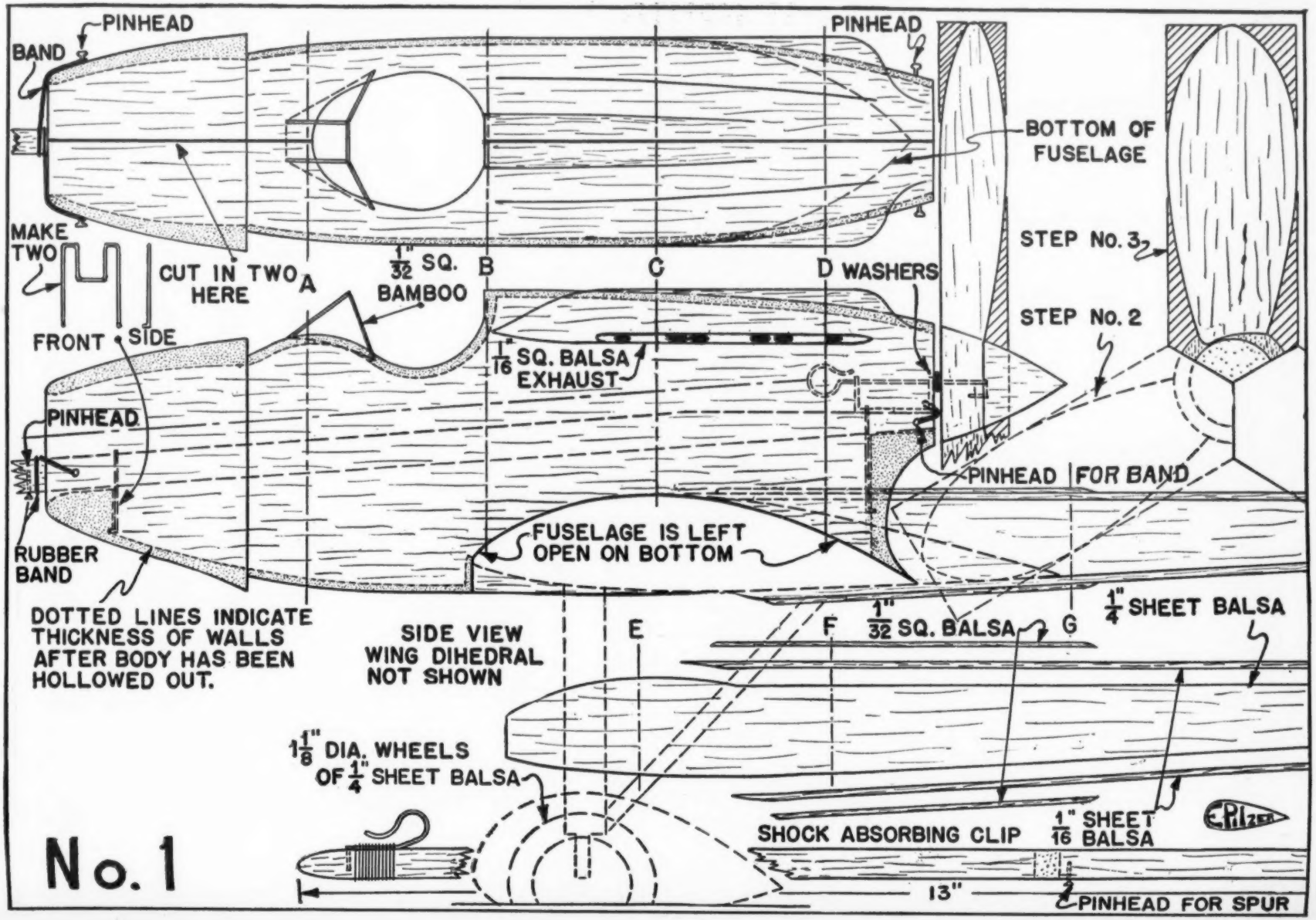
First make patterns of the side, top and bottom views of the fuselage, or suitably called nacelle. Then trace around the pattern of the side view on two blocks, ⅞″ x 2½″ x 7″, and cut them out close to the lines. The blocks are now cemented together and when dry, sanded down to the lines. A small amount of cement should be used in joining these blocks because they must be taken apart later.

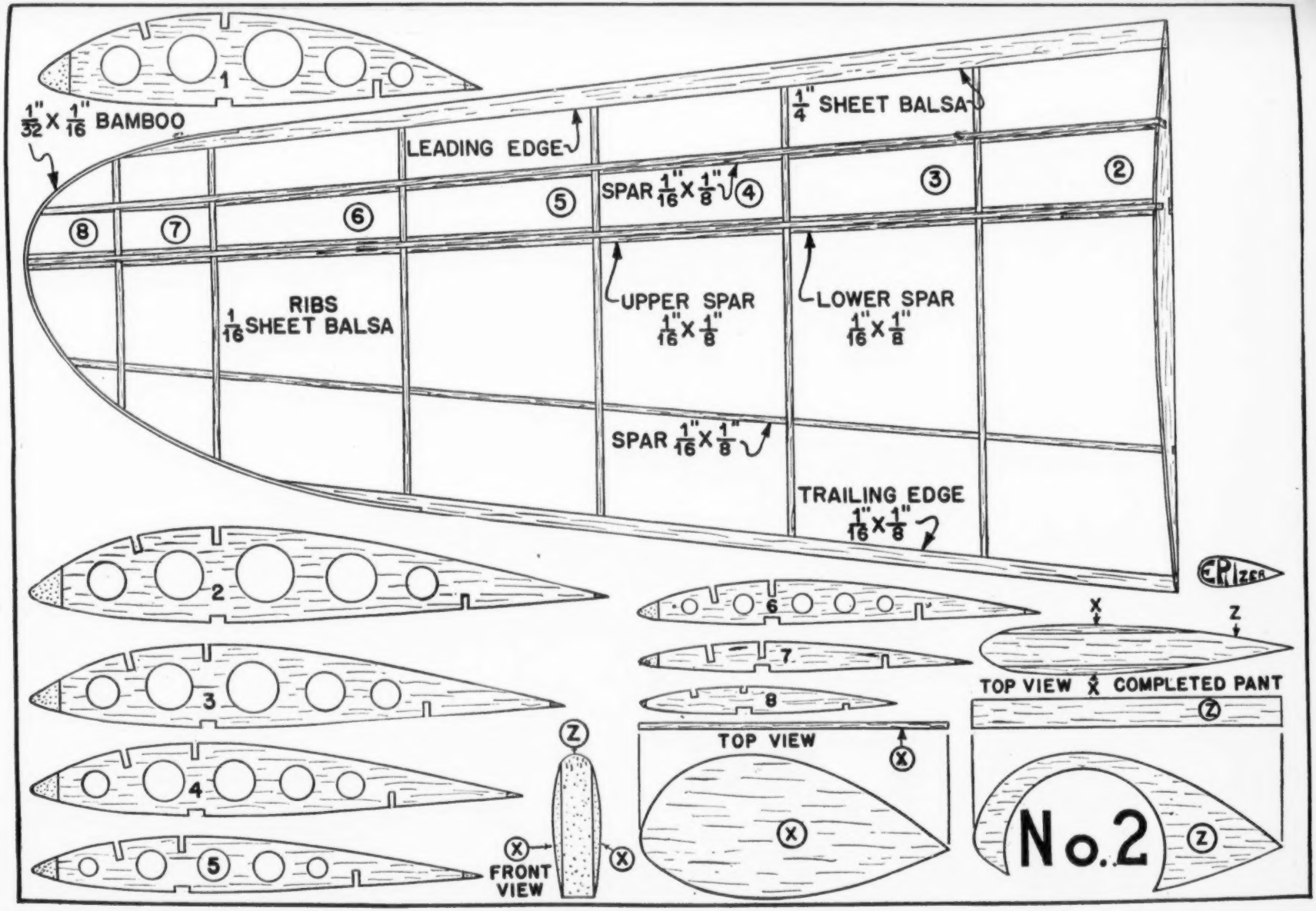
Now cut out the shape of the top view. Patterns A, B, C and D, are now traced and cut out of the thin cardboard. In order to get the shape at that particular point of the body, these patterns are put up against half of the fuselage and cut out according to that form. If you need any assistance in shaping the nacelle, you will study the picture on the cover or inside this magazine. After the outer shape has been fashioned, you will start to hollow out the insides. First pry the body blocks apart at the place where they were cemented together. Except where shown in drawings, make the walls 1/16″ thick.

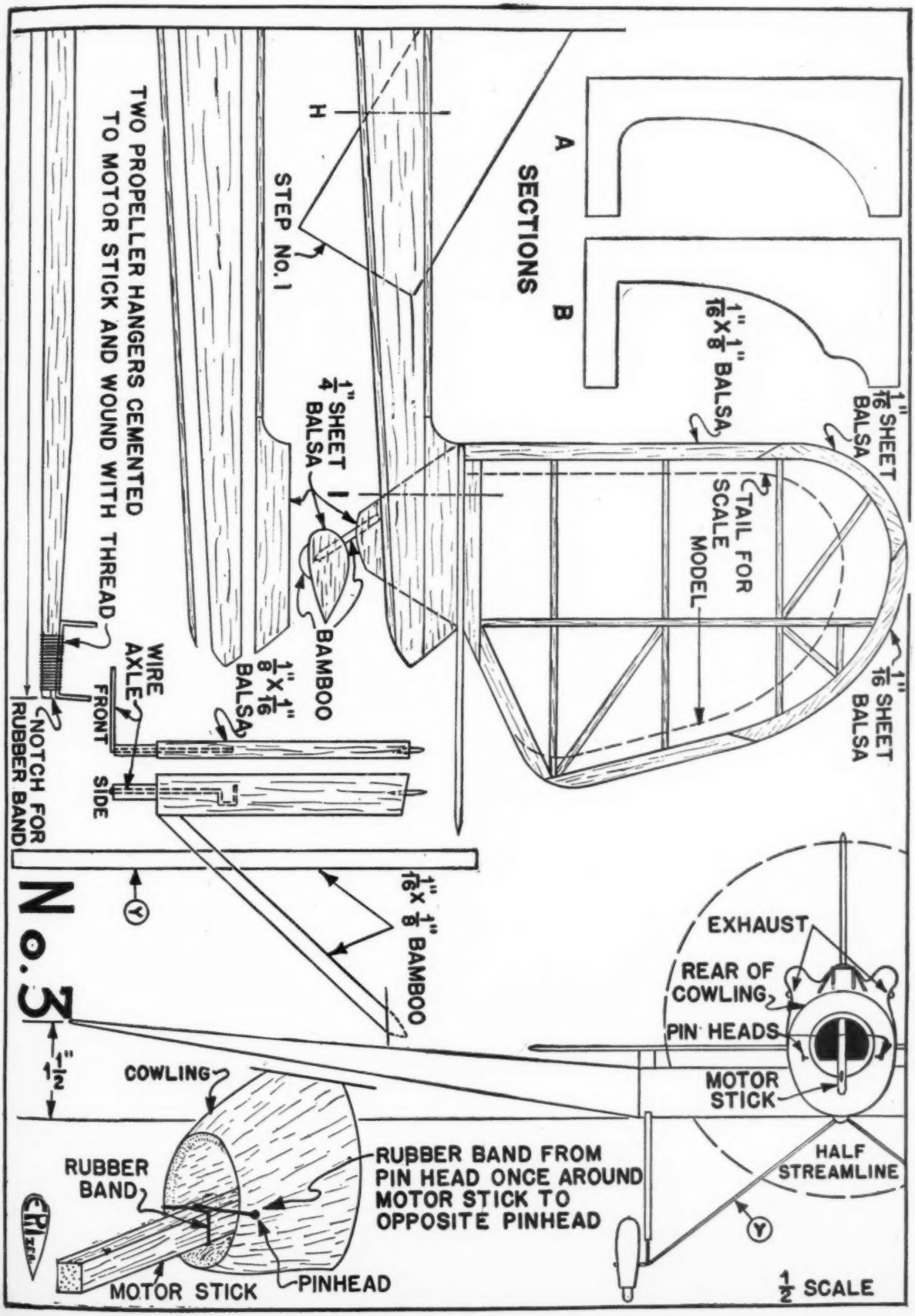
The bottom of the body (only the distance between the leading and trailing edges of the wing), is cut out to reduce weight and to cement in the wire clips for the motor stick. After this has been done, cement the halves of the fuselage together again and also cement in the clips, for the motor stick. When doing this, use a liberal amount of cement to prevent the clips from breaking loose from the fuselage. For exhausts, half round two pieces of 1/16″ square balsa, paint on small black holes and cement to the nacelle.

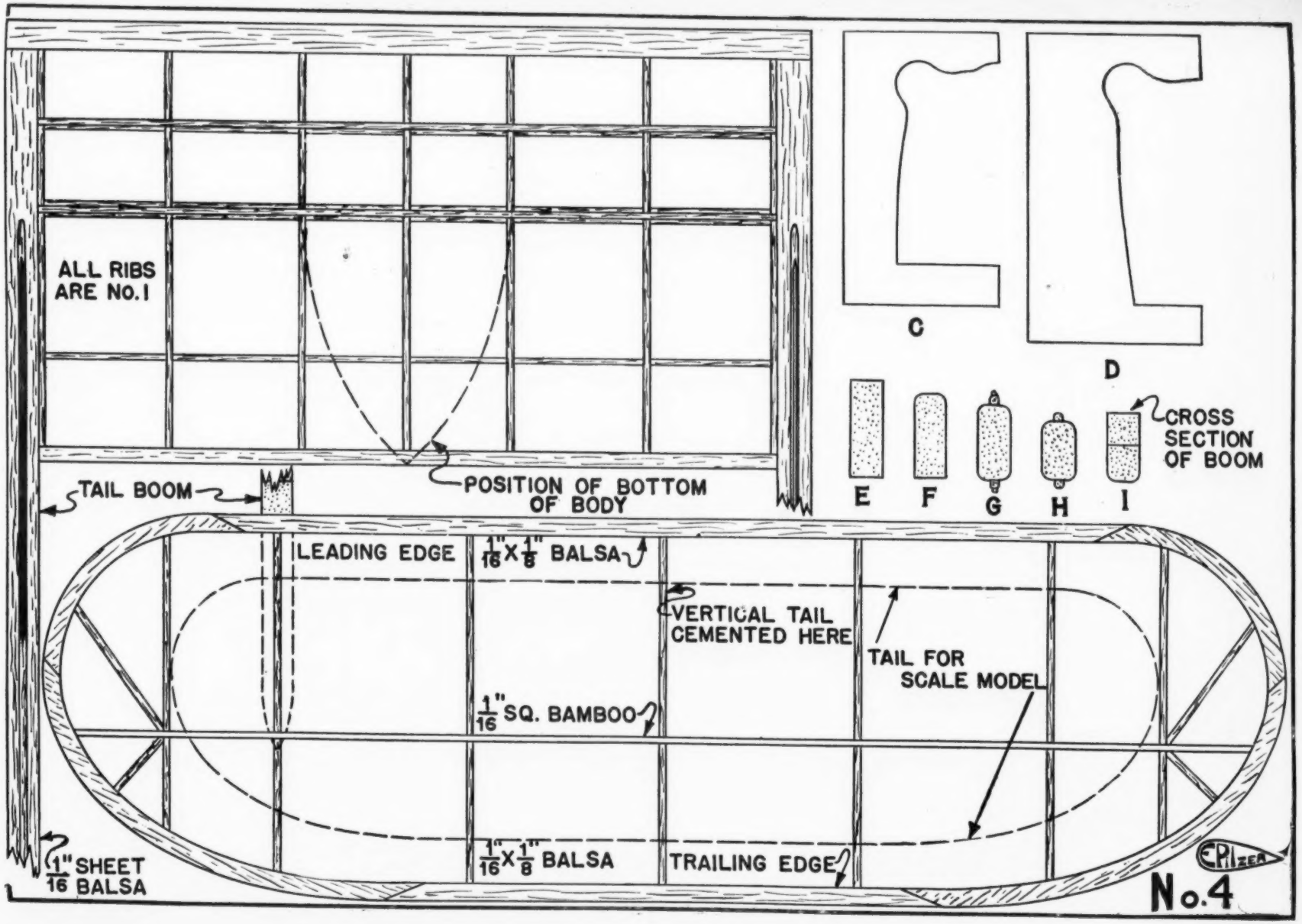
The propeller should be carved and balanced very carefully as it is the most essential part of the model in flight. First cut one end of three blocks (½″ x 1″ x 3″), to the correct angle according to the plans on drawing No. 1. Blocks should now look like Step No. 1. Cement the three blocks together and make a pattern of the blade. Now trace around the pattern on all three blocks. Blocks should now look like Step No. 2. Then cut off all the lined section shown by Step No. 3 and then the lined section of the side view of the blades. Before starting to carve the form and twist, calculate where the camber of the blades will be, so there will be no mistakes. Finally balance the propeller. This is done by thrusting a shaft through the center of hub and resting the ends of the shaft on the edges of two razor blades. If one of the blades point directly down, sand it off

(Continued on page 34)


PINHEAD
BAND
PINHEAD
BOTTOM OF FUSELAGE
MAKE TWO
CUT IN TWO HERE
A
1/32 SQ. BAMBOO
B
C
D WASHERS
STEP No. 3
STEP No. 2
FRONT
SIDE
1/16 SQ. BALSA EXHAUST
PINHEAD
PINHEAD FOR BAND
RUBBER BAND
FUSELAGE IS LEFT OPEN ON BOTTOM
DOTTED LINES INDICATE THICKNESS OF WALLS AFTER BODY HAS BEEN HOLLOWED OUT.
SIDE VIEW
WING DIHEDRAL NOT SHOWN
E
F
1/32 SQ. BALSA
G
1/4 SHEET BALSA
1 1/8 DIA. WHEELS OF 1/4 SHEET BALSA
SHOCK ABSORBING CLIP
1/16 SHEET BALSA
13"
PINHEAD FOR SPUR
No. 1


1
1/32" X 1/16" BAMBOO
LEADING EDGE
1/4" SHEET BALSA
SPAR 1/16" X 1/8"
4
3
2
5
6
8
7
RIBS
1/16 SHEET BALSA
UPPER SPAR
1/16" X 1/8"
LOWER SPAR
1/16" X 1/8"
SPAR 1/16" X 1/8"
TRAILING EDGE
1/16" X 1/8"
E. PIZER
2
6
X
Z
3
7
TOP VIEW X COMPLETED PANT
8
Z
TOP VIEW
X
Z
X
FRONT VIEW
X
X
No. 2
Z


No. 3
SECTIONS
A
B
H
STEP No. 1
1/16" SHEET BALSA
1/16" X 1/8" BALSA
1/4" SHEET BALSA
TAIL FOR SCALE MODEL
1/16" SHEET BALSA
BAMBOO
1/8" X 1/16" BALSA
TWO PROPELLER HANGERS CEMENTED TO MOTOR STICK AND WOUND WITH THREAD
WIRE AXLE
FRONT
SIDE
NOTCH FOR RUBBER BAND
Y
1/16" X 1/8" BAMBOO
EXHAUST
REAR OF COWLING
PIN HEADS
MOTOR STICK
HALF STREAMLINE
1/2"
COWLING
RUBBER BAND
RUBBER BAND FROM PIN HEAD ONCE AROUND MOTOR STICK TO OPPOSITE PINHEAD
MOTOR STICK
PINHEAD
1/2 SCALE

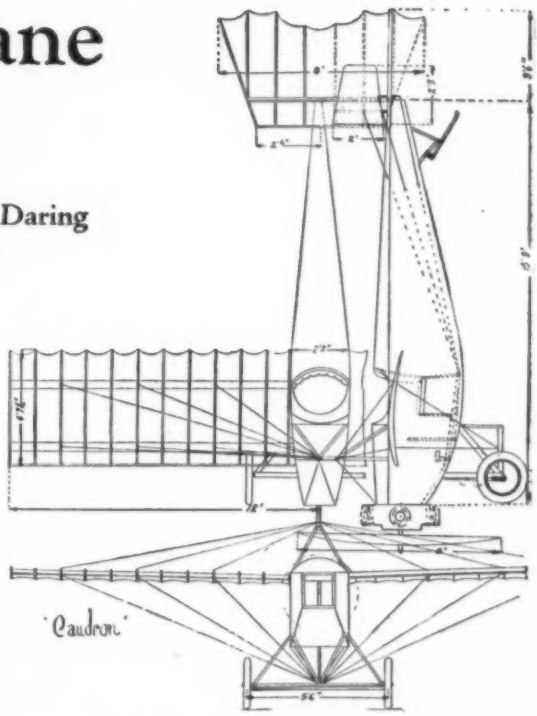

ALL RIBS ARE No.1
C
D
E
F
G
H
I
CROSS SECTION OF BOOM
TAIL BOOM
POSITION OF BOTTOM OF BODY
LEADING EDGE
1/16 X 1/8 BALSA
VERTICAL TAIL CEMENTED HERE
TAIL FOR SCALE MODEL
1/16 SQ. BAMBOO
1/16 SHEET BALSA
1/16 X 1/8 BALSA
TRAILING EDGE
EPIZEA
No.4

How the Aeroplane Was Created

The Race for Air Supremacy Begins With Daring Feats and Rapid Progress in Design and Construction

By DAVID COOPER

Part No. 7



THE decade ending in 1909 had wrought remarkable changes in the experimental field of aviation, and by the end of this period we find that the new industry, for such it was becoming, was entering a new period of rapid changes. True, a fair degree of reliability had been attained, but to these pioneers there were no limits to which these new vehicles of the air could not attain. Designers were constantly at the problem with great vigor, and pilots everywhere were successfully making new assaults upon old records and attempting new feats of daring, all the while improving upon their technique of flying.

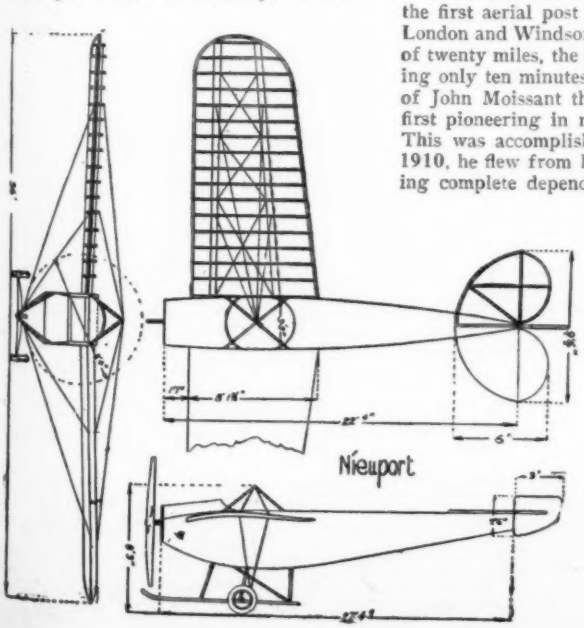
With the successful negotiation of the English Channel crossing by Bleriot in 1909, flying seemed to have passed with flying colors its critical period of incubation, and thereafter was accepted as deserving of a place in the order of things. Let us take a look into the year 1910 and note how these rapidly changing events were bringing man closer to the safe flying machine.

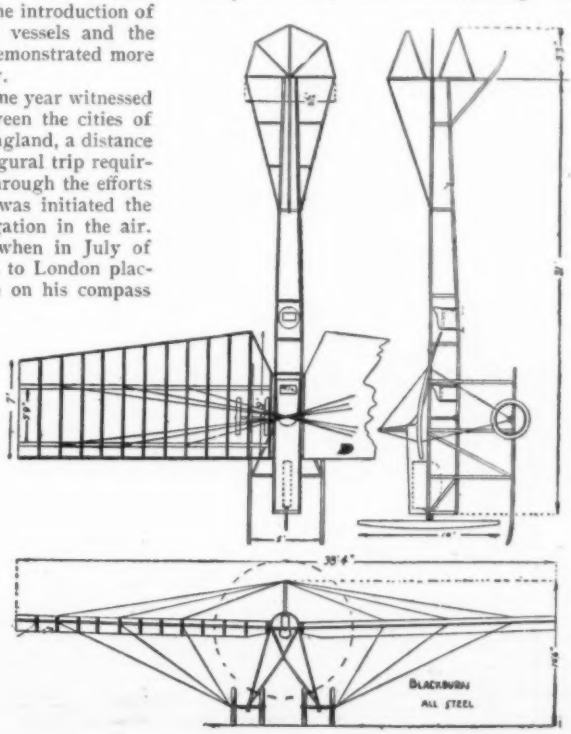
The London Daily Mail, a progressive newspaper quite alive to what aviation could mean to the world, had offered a prize of ten thousand pounds for the completion of the first flight from London to Manchester, England, with a limit of only one stop to refuel. After many unsuccessful attempts had been made, the feat was finally accomplished by a Frenchman, Louis Paulhan, flying an Antoinette Monoplane, who, on April 27th, 1910, finally crossed the line to win this rich award. It is of interest to note that on the same date and only a few hours after Paulhan had crossed the line a winner, Claude Graham-White, unaware of Paulhan's success, took off without mishap at night, the first time this feat had ever been attempted.

Shortly after, Col. McCurdy, who had been earlier associated with Glenn Curtiss in the American Experimental Association in America, and who was at this time doing exhibition flyng in England, demonstrated the reception of the first wireless signals transmitted to an aeroplane while in flight. This event was of as far reaching import as the introduction of wireless to ocean-going vessels and the proof of this has been demonstrated more than once rather recently.

The summer of the same year witnessed the first aerial post between the cities of London and Windsor, England, a distance of twenty miles, the inaugural trip requiring only ten minutes. Through the efforts of John Moissant there was initiated the first pioneering in navigation in the air. This was accomplished when in July of 1910, he flew from Paris to London placing complete dependence on his compass for guidance, from start to finish. This, in conjunction with the use of wireless, showed that there were many pioneers who were looking ahead far into the future, to the day when the aeroplane should be considered as a really safe means of transportation.

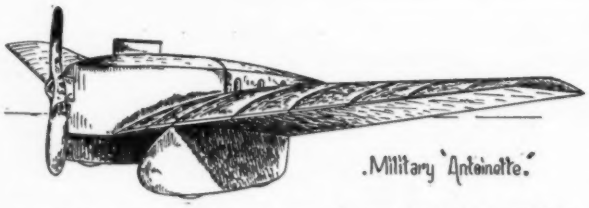
On Sept. 23rd, Georges Chevez succeeded in crossing the Alps mountains at Simplon Pass, but unfortunately he





crashed on landing and was fatally injured, dying a few days later. In the same month, Lieut. Conneau of the French Navy, won a prize of ten thousand pounds again offered by the London Daily Mail, for his outstanding flight in which he made the circuit of Great Britain. Only a short time after, Jules Verdrines the crack French racing pilot, made the same flight in slightly better time.

Louis Breguet, the French designer and pilot, is heard from again in this year when his machine of advanced design, dubbed the "Coffee Pot," was first exhibited to public gaze. In this machine, aluminum was used extensively and it was characterized by extremely clean design with a minimum of exposed parts that might cause high resistance to the air. An innovation was the use of a single strut at the extremity of each wing, doing away with the box-kite appearance of general design and at the same time having the effect of reducing head resistance greatly. Conceived from a scientific standpoint, the machine performed wonderfully and showed its mettle as a real stable flier by its ability to lift very heavy loads.



Proving that some aviation pioneers of 1912 had advanced ideas. Note the wheel pants

In December of 1910, Col. McCurdy returned to America and caused quite a furore by making the longest over-water flight recorded up to this time, flying from Key West, Florida, to the island of Cuba.

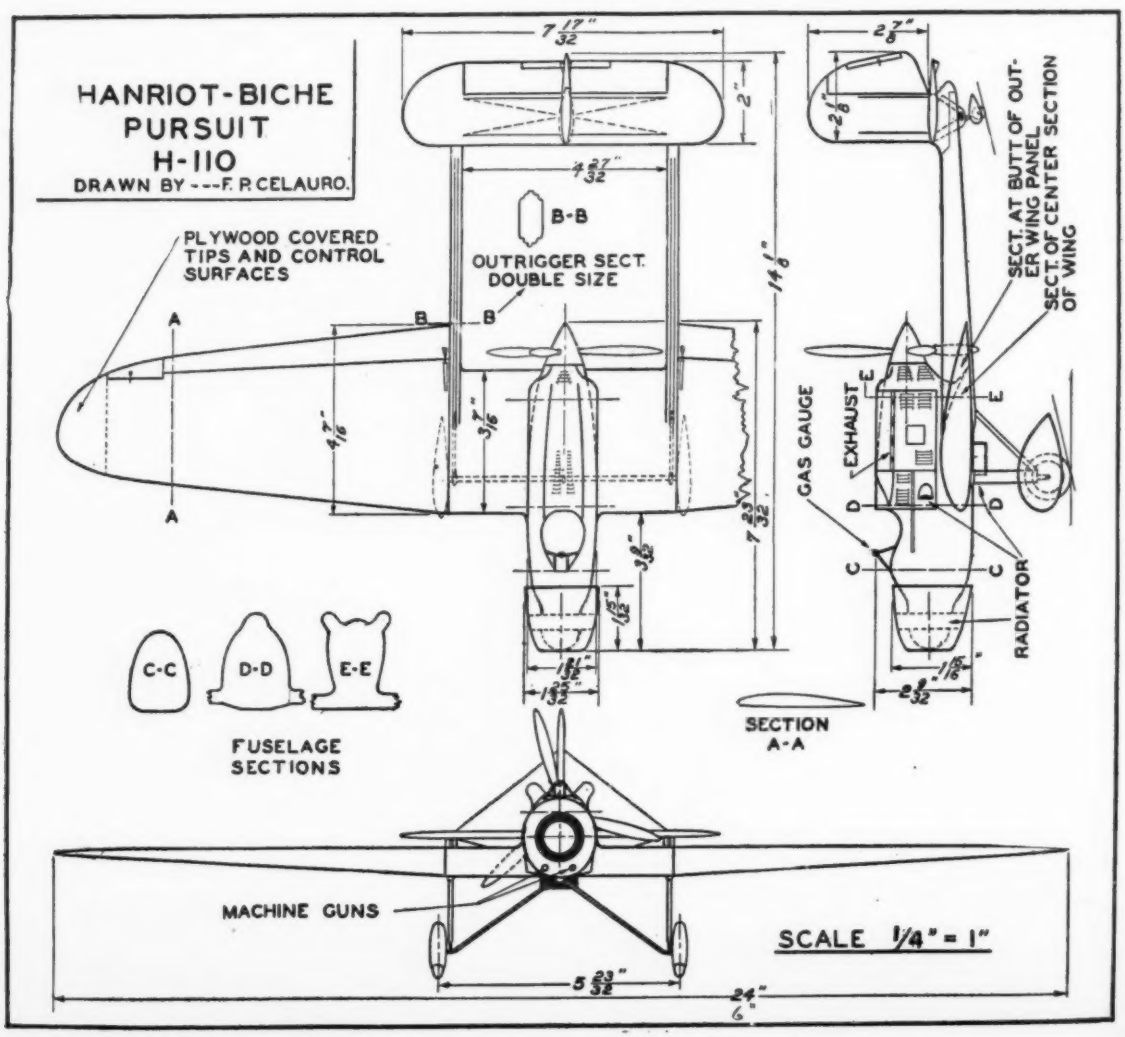
These flights were truly remarkable and one must pause to marvel at the courage of these early pioneers.

The year 1911 was marked by a great variety of new models among which the monoplane type predominated. There were also many adherents of the biplane who argued that the biplane was structually stronger, whereas, the designers of the former were of the opinion that the monoplane was more efficient, since there was less reaction from either wing upon the other, during its passage through the air.

(Continued on page 34)

A SOLID SCALE HANRIOT-BICHE PURSUIT

Here Are Plans from Which You Can Build an Exact Solid Scale Model of One of the Latest French Pursuit Ships. Models of Large Size May Be Made by Increasing the Scale. These Plans May Be Enlarged by Photostating Them



The Aerodynamic Design of the Model Plane

An Analysis of the Effect of Disturbing Influences and the Corrective Action of a Low Center of Gravity on the Longitudinal Stability of an Airplane

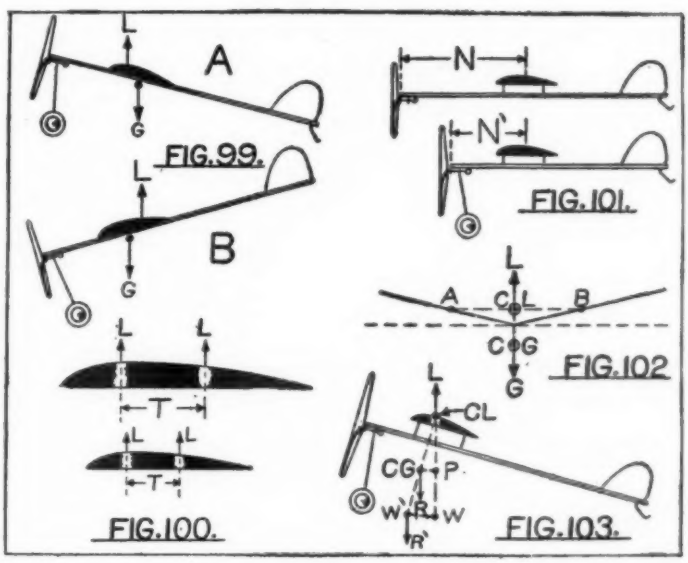
By CHARLES HAMPSON GRANT

Article No. 29 Chapter No. 3

IN THE last article of this series, it was shown how the angular setting of the stabilizer relative to the wing produces a disturbing effect when there is any change in the speed of the plane. We must now give thought to other factors in our problem that cause trouble for the airplane designer, model or large ship.

In one of the preceding articles it was mentioned that the size of the chord of the wing had considerable effect upon the longitudinal stability of an airplane; the larger the chord, the greater the disturbing effect. Some of you readers may know the answer to this one, but perhaps some new ideas will come to light if we look into the matter thoroughly.

The heart of the problem is that the movement of the center of pressure, or the point of resultant lift on a wing, is of such a character that it causes longitudinal instability. It moves *forward* when the plane noses upward and *back* when it noses down. This motion tends to increase the displacement from normal flight instead of correcting it. Fig. No. 99 shows the position of the center of pressure (or lift) in these two positions. In diagram (A) it can be seen that the lift is ahead of the center of gravity (G) at which point the weight of the plane is acting. This condition causes the nose to be pulled up more.



In (B) the plane is nosing over. Here the center of lift is back of (G), which fact pulls up the tail to a greater angle. This action has been described before, but the important point to realize here is that the distance between the forward and rear extreme limits of motion, is proportional to the chord of the wing. The larger the chord, the greater is the actual distance that the center of pressure moves backward and forward. In other words, the smaller the chord, the smaller is the travel of the center of pressure and the *less* disturbing effect it has.

Fig. No. 100 shows two wing sections, one of large chord and one smaller. It can be easily seen that the center of pressure travel (T) is less on the small wing than in the case of the larger one. On any given wing section, the center of pressure travel is a certain *percentage* of the chord regardless of the size of the chord. Actually, *the disturbing effect is proportional to the size of the chord*, therefore, the corrective forces produced by the stabilizer must be proportional to the chord. This fact tells us that the stabilizer area must be proportional to the chord length, all other factors being equal.

Before we discuss the use of (C) in a formula for stabilizer area however, we must consider other longitudinal disturbing factors, for the stabilizer corrects the effect of all collectively, not separately. This influences the set up of our formula. (The formula for stabilizer area was given on page 45 of the June 1933 issue of this magazine.)

The Effect of Distribution of Weights on Longitudinal Stability

In our discussion of directional stability, the effect of the position of the weights of the airplane structure was clearly explained. The same principles hold true in the case of longitudinal stability. The farther from the center of gravity (about center of wing) that the weights of the structure are placed, the more they will *resist* displacement, but the more difficult it will be for the plane to "right" itself when once it has been displaced.

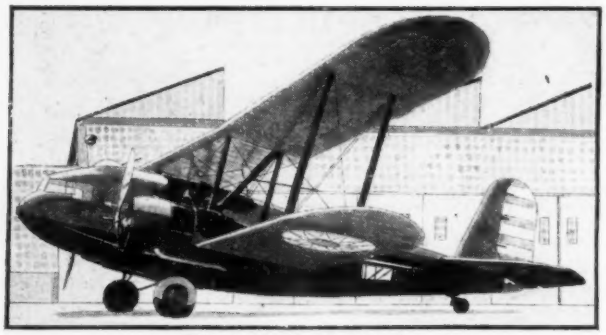
To increase or insure the longitudinal stability of a model, keep the weights of the parts that are far from the center of gravity as light as possible; for instance, the tail. Remember, do not design your plane so the parts or weights are far from the center of gravity. This means keep the nose as short as possible. If the distance from the center of gravity to the propeller is large in proportion to the moment arm of the tail, the weight of the propeller and structure of the plane forward of the wing, will be large and a considerable distance from the center of gravity. The effect of this weight far out from the center of gravity, will be difficult for the stabilizer to overcome and control. Probably many readers have experienced difficulty in the case of long-nosed stick models, without suspecting what was the cause of the trouble. In such planes, if you attach a landing gear and wheels to the nose or front end of the stick, so the wing can be moved forward thus shortening the nose, you will find the longitudinal stability greatly increased. Fig. No. 101 shows two planes one with a long nose (N) and the other with a shorter nose (N'). The plane with the short nose (N') is the more stable of the two.

Anything which tends to resist the righting action of the stabilizer to bring the nose down or bring it up to normal flight position as the situation may demand, detracts from the longitudinal stability of the plane. Weight will do this as we have explained, because it has inertia. Once it starts moving upward or downward out of the normal flight position, it tends to *keep moving*, thus resisting the righting forces.

There is another factor which tends to resist the righting forces, however. It is the propeller. The larger the propeller, the less longitudinal stability the plane will have. This is due to its gyroscopic action and its area. Most of you know that when a wheel or some other similar object spins at considerable speed it resists any force which may try to change the attitude of its plane of rotation. Now, if a plane is nosed upward into a climb, nearly stalling, the spinning propeller tends to hold the plane in that attitude. The corrective forces must be great enough to overcome this resistance.

The area of the propeller resists the righting forces because it acts like a tail plane, tending to hold up the nose just as the stabilizer holds up the tail while the weight of the airplane is pulling down the nose.

(Continued on page 42)



The Curtiss Condor Bomber

AIR-WAYS

HERE AND THERE

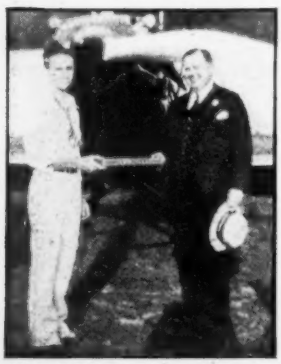
What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

Tell Us What You Like or Dislike About Universal Model Airplane News

Pict. No. 1. One of the best speed ships we have seen, by Russell Peak

Pict. 16. A solid scale Howard Racer by W. Wilkerson

Pict. No. 2. Here is a real flight picture by Nigel Jones



Pict. No. 6. Charles Johnson Jr. wins five events at meet

More news comes this month from many builders new to the "Air Ways" column. Our heading however, is as usual by our good friend, Harland C. Wood of Lyndonville, Vt. He pictures very exactly a new Curtiss Condor Bomber, several of which Commander Hawks has taken to China to demonstrate to the Chinese government. (Not the pictures). In the article appearing on page 11, you can obtain full details of this ship. Plans to build a solid scale model are also provided.

There is a young man named Russell Peak who resides at 142 N. Harkness St., Pasadena, Cal., and who is extremely interested in obtaining speed from his model ships. He wished to see what refinement and streamlining would do for a regular fuselage model, so he set to work with his drafting board and fertile mind to produce a fuselage speed ship. The result of many hours of intense work is shown in picture No. 1.

He says, "The third flight it made was enough to compensate me for all the work and effort I put into the little ship. It surely did make time 'getting itself hence' and climbed nicely and evenly as long as the propeller was turning. The ship has a wing span of three feet and it will quite easily make flights of over a thousand feet. It has never climbed any higher than about fifty or sixty feet, for its climb is all performed at a very small angle."

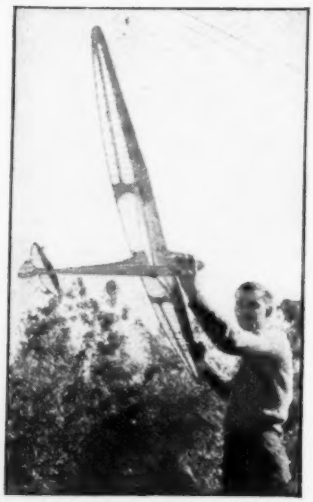
The excellent streamlining effect of the body is obtained by using fourteen ⅛" longerons instead of adhering to the common practice of four stringers with fairing. The cantilever landing gear is quite a feature.

Nigel Jones of 2476 W. 6th Ave., Vancouver, B. C., has managed to snap his model Hall-Springfield racer in flight, as shown in picture No. 2. Taking a picture of any model in flight is quite a stunt. This is a fast ship and Jones should be commended for his accomplishment. The model has a wing span of thirty inches.

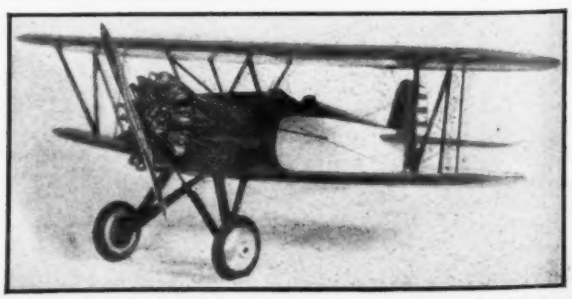
Pict. No. 3. Norman Halsey experiments with this flying wing

Many model builders like to wander from the beaten path of design. One of them is Norman Halsey of 811 Tangerine Ave., St. Petersburg, Florida, who sends us picture No. 3 of his tailless bat wing plane. It has a span of twenty-eight inches and weighs only one and one-quarter ounces. He says, "In spite of its short

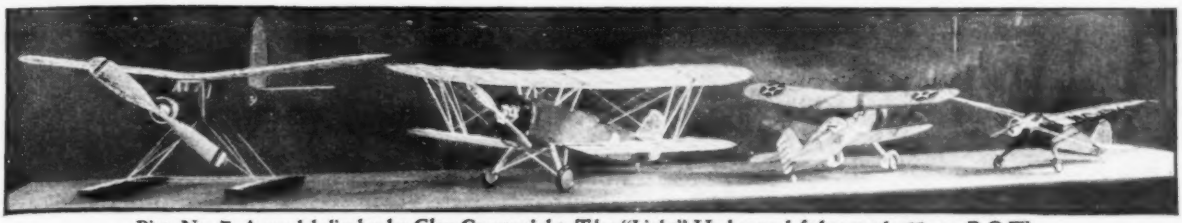
Pict. No. 8. Alan Booton's Gordon Light Hydro taking the air



Pict. No. 4. Don Stevens with his 8 ft. detail model of a "Bowlus"



Pict. No. 5. Michael Holly took one year to complete this Boeing



Pict. No. 7. A model display by Glen Courtwright. The "Light" Hydro on left has made 65 sec. R.O.W.

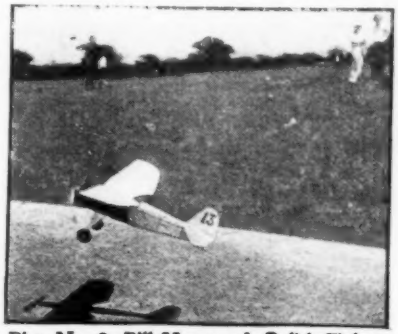
motor length it has quite good duration. It will do half a minute consistently, hand wound. Its stability is excellent once it is adjusted properly." Halsey gets our special commendation this month for original design.

There is an especially fine workman, Don Stevens, who lives at 3005 Highland, Ocean Park, Cal. He has been working for Hawley Bowlus, the glider expert, helping him build sailplanes. However, he has managed to find time enough to construct a model of the latest Bowlus ship. He is shown holding it in picture No. 4. He tells us that he presented this model to Mr. Bowlus in return for two airplane tows in his glider. This is one way of learning to fly. Turning model building into flying training is not a bad idea. Incidentally, it required three weeks to build this model. When finished it was entered in a scale model contest and took first place. The ship has a wing span of eight feet.

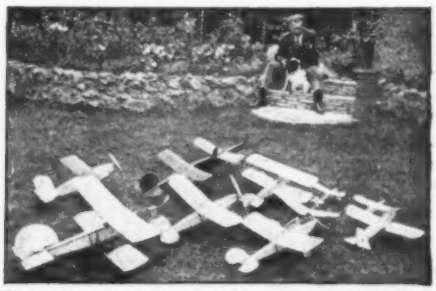
Michael Holly of 5405 So. Maplewood, Chicago, Ill., sends us picture No. 5, which shows his detailed scale Boeing P12-B which took Holly one year to complete. The picture does not do it justice for the detail work cannot be seen here. All the controls operate and the engine revolves, being turned by an electric motor which is controlled by a transformer. On this ship there are details such as spark plugs, ignition wires, hollow engine shaft, corrugated tail covering, tubular landing gear with shock absorber and bearings on the wheels, just like the big ship. The propeller blades and the hub are carefully machined and cannot be distinguished from the full-sized propeller even upon close examination. This is the best detail scale model for this month.

There is a young man named Charles Johnson, Jr., living at 2208 E. Concord, Orlando, Florida, who recently entered a contest held by the St. Johns River Valley Model Airplane Club, at Orlando. He was not the only one who entered the contest, but he was the only one who left it with five first prizes out of a total of seven first places; besides this he won second and third places. To our knowledge this is the biggest "white-washing" that any one boy has ever given his fellow contestants. Picture No. 6 shows Johnson and Governor Dave Sholtz immediately after the contest. Governor Sholtz presented the prizes to the "winners."

We hope that Johnson will not confine his activities to Florida but will give a chance to some of our experts in the neighborhood of Boston, Philadelphia, New York, California, St. Louis and other model centers to measure their model strength with him.



Pict. No. 9. Bill Hampson's Polish Fighter



Pict. No. 11. Mr. Arthur Yeomans and his fleet

Pict. No. 12. Gordon Light's 1933 Wakefield entry on a trial flight

Pict. No. 13. A 6' 9" model by R. Galloway, winner of Victoria contest

Our old friend Glen Courtwright of 222 N. College St., Lincoln, Ill., is not neglecting us. He sends us picture No. 7, showing a line-up of several of his models. Left to right they are: Gordon Light Seaplane, Boeing Mail 95, Curtiss Goshawk and a Stinson Reliant. The workmanship, as you can probably see from the picture, is up to the regular Courtwright standard. He says that the Gordon Light Seaplane has made sixty-five seconds R.O.W. The other ships are all good fliers.

Picture No. 8 shows Alan D. Booton's Gordon Light Hydro in a dramatic moment. It is leaving the

(Continued on page 38)

Pict. No. 14. J. W. Kenworthy and his model which won the Wakefield International Competition

Pict. No. 10. J. Jago and his record indoor endurance ship

Pict. No. 15. B. K. Johnson's gas job. It weighs 4½ pounds

THE NATIONAL AERONAUTIC ASSOCIATION JUNIOR MEMBERSHIP NEWS

1934 National Championship Meet

MODEL airplane enthusiasts are looking forward to the biggest and most interesting National Championship Model Airplane Meet ever held. A swarm of model aviators is converging on Akron, where the 1934 National Championship Meet is to be held, June 27-29. Word has come from coast to coast that interest is running high. You still have time to make application for entry blanks, but act quickly. Send a self addressed and stamped envelope to Dr. Theodore Troller, Guggenheim Airship Institute, Akron, Ohio. He will send you complete information and tell you how to register. All registrations must be received not later than June 20 so you must work fast.

The meet is to be held at the Akron Municipal Airport where the mammoth Goodyear-Zeppelin Airship Dock stands out so prominently. Arrangements have been made to care for an extra large number of contestants and spectators. The flying field is very extensive and nobody will be crowded for space in which to fly his models. There will be numerous automobiles on hand for the timers and flyers to pursue far traveling models in the outdoor events. At times in Akron there are perfect soaring conditions under cumulus clouds so it will not be surprising if many a model is taken for a soaring flight of many miles. The timers will be equipped with powerful binoculars and accurate stop watches so that every second of flight time will be recorded.

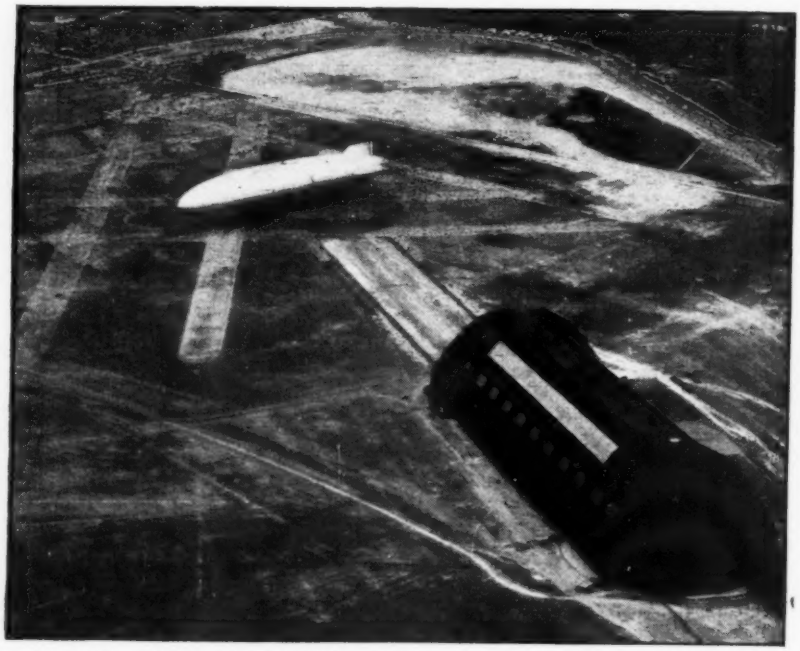
The indoor records should eclipse all of the officially recognized flight times. There are only the two regular indoor events, Stout and Bloomingdale, and no contestants will be unduly rushed. There will be an absolute minimum of interference of any sort. Conditions are to be made as nearly perfect as possible so that every model will have a chance to show its best performance. Truly, the 1934 National Championship Meet is the one occasion in model flying that you should not miss.

The sponsors, Akron Women's Chapter of the N.A.A., Men's Chapter N.A.A., Chamber of Commerce, and UNIVERSAL MODEL AIRPLANE NEWS, are all doing their utmost to assure you a wonderfully good time. There will be a number of surprise events for your entertainment. You will not have an idle moment on your hands after you have arrived in Akron. Special effort will be made to give you the opportunity of seeing the rubber metropolis of the world at its busy task, supplying most of the rubber tires and other rubber goods to the country.

Special rates will be in effect at the Mayflower Hotel, which is to be the Meet Headquarters. This is where you should report first immediately upon your arrival. From the moment you have reported at Meet Headquarters, your stay in Akron will be a very busy one.

There will be a convenient workshop for final repairs and adjustments. Provision will be made for microfilm repair work as well as for the more conventional tissue paper models. Many of the experts are planning to do all their microfilm covering at Akron instead of running the risk of travel injury to their delicate models. It would be a good plan to bring your own equipment for this as too many contestants all using at once the facilities that are to be provided might mean that you would be delayed.

The beautiful scale model exhibit will be on display all during the week of the meet. These non-flying models and the numerous trophies and cups will make a fine display. If you are planning to ship a scale model to Akron for this contest, you must have it boxed securely against injury, and in Akron not later than June 20, when the judges are to start the difficult task of grading the entries. It is necessary to make entry for exhibition scale models on regular forms so be sure to write for these in plenty of time. Dr. Troller will send them to you on request just the same as for the flying models. It is not necessary for you to come to Akron in order to enter the scale model event. Just ship your model in accordance with the instructions that will be given to you, but of course you will be more than welcome if you care to come to the meet.



An aerial view of Akron Municipal Airport showing the Goodyear-Zeppelin Airship Dock.

This meet is for Members of the National Aeronautic Association exclusively so if you have not already joined the Association, you may do so by using the coupon which you will find in these pages. This is important as only junior members of the N.A.A. are permitted to take part in the Championship Meet. However, special arrangements are being made for those older fellows who are twenty-one or over and who for the first time in recent years will be competing under N.A.A. rules for special prizes in the newly authorized open age class. These open class entrants need not be members of the As-

sociation in order to compete. If they are not N.A.A. members, the Association has made a special concession similar to a sporting license in man-carrying air race meets. Of course those who are actually members of the N.A.A. need no further credentials, but to those open class flyers who are not members, a special one year's model plane contest permit will be issued by the N.A.A. for one dollar. This permit may be obtained from the Association on application in letter form.

The N.A.A. has already obtained a fine trophy for the Indoor Stick Model Contest which will be awarded for one year to the open class contestant winner of this event. This trophy has been offered to the N.A.A. by Mr. Ernest A. Walen of the Springfield Model Airplane Club, Springfield, Mass. It is hoped to have a similar trophy for every open class winner by the time of the meet. A number of the older fellows have already indicated their intention of coming to Akron and competition is sure to be keen. The open class contestants are not permitted to complete against the juniors and seniors excepting in the Moffett International Contest. In this particular event, all contestants are on equal basis, regardless of age.

The Akron sponsors are providing lunches for each contestant on the two days of the model flying contests. These will be served at noon during the meet. On the final evening there will be a wonderful banquet in the Hotel Mayflower to which every contestant is invited as the guest of the Akron sponsors. This banquet will be something to remember all your life. The speakers will be prominent aviation enthusiasts, pilots, officials and other nationally important persons. The banquet committee has promised an especially interesting and entertaining banquet program. At the banquet, will be awarded all the prizes.

You cannot afford to miss this year's meet, so if you have not already done it, get off a request to Dr. Troller for complete information. Then make out your entry forms and mail them before June 20. This is the only way by which you may enter the meet. Do this promptly and come to Akron prepared to take part in this greatest model plane event of the year.

New Model Plane Records

THE Contest Committee of the N.A.A. has officially recognized three new records. They were all made by Philadelphia boys in the recent Sixth 1933-1934 Indoor Meet held by the Philadelphia Model Aeroplane Association.

STICK MODEL AIRPLANE, Class A, R.O.G., INDOORS. Junior: Hyman Oslick, age 14. 9 minutes 11 seconds.

STICK MODEL AIRPLANE, Class B, R.O.W., INDOORS. Senior: Jesse Jessen, age 18. 5 minutes 42 3/5 seconds.

FUSELAGE MODEL AIRPLANE, Class B, R.O.G., INDOORS. Junior: Theodore Golomb, age 14. 6 minutes 26 seconds.

The new record of Hyman Oslick is particularly noteworthy. It nearly equals the senior record for its class held by Carl Goldberg, 9 minutes 34 4/5 seconds.

Record certificates are being prepared for each of these new record holders.

News of the Chapters

AKRON Junior Chapter has been very busy preparing for the entertainment of national contestants at the 1934 National Meet. The chapter is holding a model plane meet June 2; the winners to take part in the National events. The other members of the chapter are planning a very entertaining model airplane circus of novelty flying and stunts which will be one of the features of the National Meet. This is sure to prove of great interest to the large crowd of spectators and to the contestants who are for the time being not engaged in flying their own contest models. Akron is an especially good model plane city with several hundred builders and flyers who are constantly active. Another project which this chapter has undertaken is to provide an evening of entertainment for the visitors to the city on June 27. They are busily engaged in rounding up an all star aggregation of performers.

WENATCHEE, Washington, is fortunate in having Mr. Ray W. Clark, Manager of Cascadian Hotel, who is forming a new chapter of junior members. This city will be remembered as the place where in 1931 Clyde Pangborn and Hugh Herndon ended their dramatic non-stop flight across the Pacific from Japan.

PROVIDENCE, Rhode Island, is soon to have a junior chapter. At a recent meeting of the Lennon Model Aero Club it was decided to organize a Providence Junior Chapter. All model builders in the Providence area are urged to communicate with A. E. Huntley, 15 Lennon Street, who is doing the foundation organization work.

CLEVELAND, Ohio, activities in the model field have been somewhat dormant this spring but Mr. M. A. Anderson of 8203 Superior Avenue, Cleveland, reports that he is organizing a chapter. He is ready to give the details to any Cleveland model aviator who will get in touch with him.

BAMBERGER Aero Club, the Newark, New Jersey, N.A.A. Junior Chapter, plans to engage a special bus to transport club members to the big meet in Akron. A large turnout of club members at all model plane meets has always been one of the rules of this enthusiastic chapter. Mr. Irwin S. Polk, Club Director, will be pleased to receive reservations for this trip from club members.

BOSTON, Jordan's Junior Aviation League, the Association's Boston Junior chapter is busily engaged in preparation for the New England Championship Meet. This event has all the pre-contest indications of being the largest affair of its sort ever held in New England. New city records are confidently anticipated and it would not be surprising if some of the present American records were broken as the Boston experts are well known for their ability. One of this club's members, John Bartol holds the American record for Indoor stick models, which he established last year at the National Meet in New York City.

Wakefield International Competition

THE WAKEFIELD International Competition, to be held in England, June 24 at Warwick, has attracted a full team of six entrants from the United States. These are: Gordon Light of Lebanon, Pennsylvania; Leslie M. Adams of Peru, Indiana; Walter Getsla of the Illinois Model Aero Club, Chicago; Alton Du-Flon, Jr., Ridgefield, New Jersey. Two additional entrants are still to be named as a result of elimination meets that are being held in Worcester, Massachusetts, and the New York metropolitan district. This is the first time in several years that the American team in this competition has numbered the total allowed under the rules of the Society of Model Aeronautical Engineers of England, the sponsors of the Wakefield Competition. Last year this country was represented by only one entry, Gordon Light, and he finished third in almost a tie with the entrant from England who placed second. The event was won by England last year.

The Moffett International Contest

THE Moffett International Contest for the Admiral William A. Moffett Memorial Trophy is to be held as a part of the 1934 National Championship Meet at Akron, June 28th. Word has come from England that five models are being shipped across the Atlantic for this contest. It is also expected that additional foreign entrants will be received from Australia and New Zealand. Scotland is being represented by one entrant. The English team is composed of C. E. Bowden, S. E. Capps, F. Date, J. W. Kenworthy and L. A. Wood. These five are among the best of the English model builders and flyers. Teams from the United States and Canada are to be selected by competitive flying at Akron on

the day of the contest. Each country is allowed six members on its team.

Foreign entrants who are not able to accompany their models are permitted to have their models flown by proxy. This year will see English builders flying the American entries in the Wakefield Competition, and Americans flying the English and other foreign entries in the Moffett Contest. This is a novel arrangement incident to international competition.

Club Suggestions

Judging from the number of letters of appreciation that are being received at the Association's headquarters in Washington, the N.A.A. record certificates for model plane record flights are mighty popular with those who have earned them. These certificates are beautifully engraved documents that are worthy of framing for perpetual safe keeping. It is a source of real satisfaction to be the owner of a record certificate and the only way to get one is to establish a new model plane record in a regularly sanctioned N.A.A. meet.

It is evident that more contests are being held this season than ever before. One of the surest ways to hold a club together is to have frequent model flying contests. It is not necessary to award valuable prizes for every contest. The experience gained by flying in competition and the steady improvement that this promotes is sufficient reward when prizes are not available.

Flying contests are not the only sort of club competitive activity as there are a number of other interesting ways to stimulate the competitive spirit. Some clubs reward the member who shows the most consistent attendance at club meetings. Other clubs have debates on aeronautic subjects that always prove interesting and thought provoking. Another popular contest is to see which member can name correctly the largest number of planes from an assortment of photographs or prints. It is surprising how much general knowledge of aviation this will give you.

Lighter-Than-Air Scale Models

Many builders of models are very adept at constructing excellent lighter-than-air models. A well constructed model dirigible is fully as complex and interesting as a model of a heavier-than-air machine. As a special subdivision of the Exhibition Scale Model Contest in Akron, there will be an exhibit of lighter-than-air craft. Any model of less than forty-eight inches over all length is eligible for this event. Those of you who have a model of this type are especially urged to enter it in the contest. This is quite appropriate this year because of Akron's being the home of the American Dirigible.

American Legion Model Plane Contests

The Aeronautics Commission of the American Legion is encouraging Legion Posts to hold model plane contests. It would help the cause along if the model builders and flyers would contact their local Legion Posts on this and show a real interest. It often happens that conditions are just about made to order for holding a contest in your community, but because of hesitancy in showing sufficient interest in the proper places, the possible sponsors never know how much interest there actually is. The American Legion is always ready to help along a worthy cause, and the Legion's interest in model planes is an added evidence of this.

Scrap Books

N.A.A. officers have seen some interesting scrap books recently. There are always opportunities to gather suitable photographs, clippings, and other material for pasting in a loose-leaf note book or ledger. Photograph albums also make good scrap books. The story told by a well kept scrap book is worth many times the effort required. In fact it isn't an effort at all but a pleasure. With so many interesting aviation happenings as there are these days, there could be no better time to start an aviation scrap book.

Insignia

How many military insignia or commercial trade-marks do you recognize correctly? This is a subject all by itself that is worthy of study. Some fellows have a special knack for naming these airplane emblems on sight.

Triangular Motor Sticks

The accompanying plan for an indoor stick model shows a triangular motor stick that is especially stiff for its weight. If you build this model be sure to select balsa wood for the stick that is just a shade on the hard side rather than too soft. The model is a good performer and rugged enough to stand quite a bit of hard use, yet light enough to have a chance in a contest. The total weight of the model with rubber motor is .12 ounce, which with its nearly 150 square inches of wing area gives a low wing loading. The shape of the propeller blades is such that a slow turning propeller is the result.

JOIN the N. A. A. as a junior member interested in models and enjoy the benefits of membership in a real national organization with the satisfaction of knowing you are working side by side with the nation's leaders in aviation activities. This association has for its purpose the encouragement and advancement of aeronautics and the determination to keep America "first in the air." Only members of the Association are eligible to compete for N.A.A. model plane trophies and to have their record making model plane flights recognized officially by the Contest Committee. As the representative in the United States of the Federation Aeronautique Internationale, the Association has as a special responsibility the encouragement and regulation of air meets, races, and record trials.

NATIONAL AERONAUTIC ASSOCIATION OF U. S. A.
DUPONT CIRCLE
WASHINGTON, D. C.

I hereby make application for membership in the National Aeronautic Association as a Junior Member. I am under twenty-one years of age.
I enclose fifty cents for initiation fee and first annual dues (Use check or money order.)

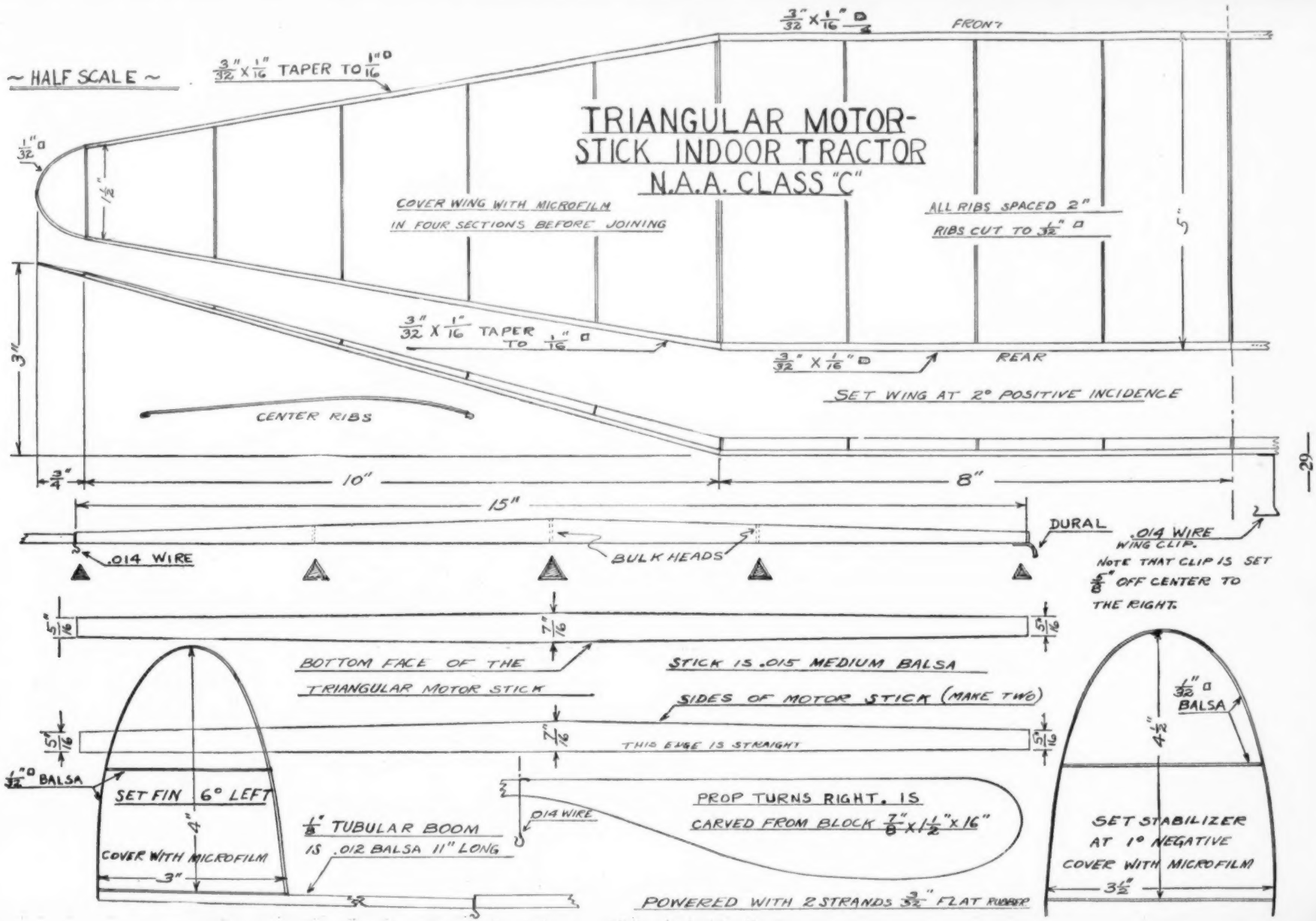
Name .....
(Please print or type)

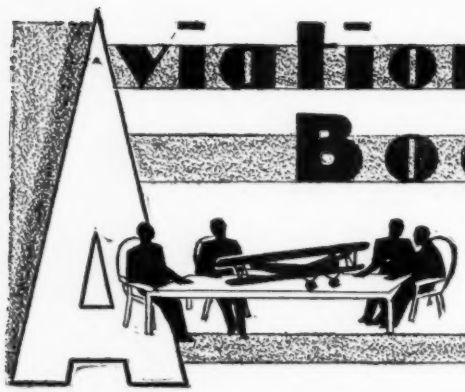
Street .....

City ..... **State**.....

Date of Birth .....
(Month, Day, Year)

Approved .....
(Parent sign here, if applicant is under eighteen)


~ HALF SCALE ~
3/32" X 1/16" TAPER TO 1/16" D
3/32" X 1/16" D
FRONT
TRIANGULAR MOTOR-
STICK INDOOR TRACTOR
N.A.A. CLASS "C"
1/32" D
1 1/2"
COVER WING WITH MICROFILM
IN FOUR SECTIONS BEFORE JOINING
ALL RIBS SPACED 2"
RIBS CUT TO 3/32" D
5"
3/32" X 1/16" TAPER TO 1/16" D
3/32" X 1/16" D
REAR
SET WING AT 2° POSITIVE INCIDENCE
3"
CENTER RIBS
3/4"
10"
8"
15"
DURAL
.014 WIRE
WING CLIP.
.014 WIRE
BULK HEADS
NOTE THAT CLIP IS SET
5/8" OFF CENTER TO
THE RIGHT.
5/16"
7/16"
5/16"
BOTTOM FACE OF THE
TRIANGULAR MOTOR STICK
STICK IS .015 MEDIUM BALSA
SIDES OF MOTOR STICK (MAKE TWO)
5/16"
7/16"
5/16"
THIS EDGE IS STRAIGHT
1/32" D BALSA
SET FIN 6° LEFT
4"
COVER WITH MICROFILM
3"
1/8" TUBULAR BOOM
IS .012 BALSA 11" LONG
.014 WIRE
PROP TURNS RIGHT. IS
CARVED FROM BLOCK 7/8" X 1 1/2" X 16"
POWERED WITH 2 STRANDS 3/32" FLAT RUBBER
1/32" D
BALSA
4 1/2"
SET STABILIZER
AT 1° NEGATIVE
COVER WITH MICROFILM
3 1/2"



Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U. S. Army

THE usual number of interesting questions have come to us this month. However, there are a number of model enthusiasts who sent in questions to us some months ago, which we have been a little late in answering. Therefore, we will try to relieve their suspense.

Here we have a question from Dudley Smith of 135 New York Avenue, Brooklyn, New York.

Question: Would not an airplane wing whose under surface was corrugated in the direction of its length, be more effective than the ordinary wing?

Answer: No. Such a wing would give so much resistance that it would be useless; nor would any stability be gained by such a practice.

Bill Starrett of 1502 Hood Avenue, Chicago, Ill., asks the following questions:

Question: Why are the propellers on the Boeing Transports and bombers placed so far ahead of the wing? Does this increase or decrease the speed?

Answer: There are two possible reasons for this. One is that the air stream from the propeller does not interfere with the lift of the wing to as much an extent when placed forward as if it were close to the wing. When the propeller is close, the turbulence or boiling of the air over the wing would disturb the air flow. Secondly, the motors on the ship must be placed well forward in order to bring the center of gravity forward and have the plane balance properly. If the motors were not in this position the body would have to be lengthened; the passengers and equipment would have to be moved forward. This would make a much heavier body.

Question: What effect would the lack of uptilted wing tips have upon the stability of an autogiro?

Answer: An autogiro would probably lose a certain amount of its lateral stability and possibly have a tendency to oscillate from side to side.

Question: Did Bleriot have any means of keeping his channel-crossing plane afloat in case it fell into the water?

Answer: We do not know definitely whether he did or not. It is understood that he had a small tank to help float the machine in case of immersion.

Roger W. Leet, Jr. of 1611 Lucia Avenue, Louisville, Ky., asks some questions about a glider. It seems that quite a number of readers are becoming interested in this sport.

Question: What should the dimensions be for a hang glider to carry ninety pounds or less?

Answer: The first question is, how much less than ninety pounds? However, a glider having a young man of this weight, should not be less than between twenty to twenty-five feet wing spread, with from one hundred seventy-five to two hundred square feet of area. Less area than this would necessitate too fast a take off, and after all, there is a limit to the speed at which one may run. The smaller the glider, the stronger the wind would have to be in order to take off, and a wind is not always the safest thing to fly in.

Question: What kind of shock absorbers are used on most planes?

Answer: Most planes use rubber shock absorbers or shock absorbers which afford elasticity from the use of rubber cord.

Question: What are some of the materials that could be used for covering a hang glider?

Answer: I would suggest unbleached muslin which should be doped with a solution of melted parawax in gasoline, after the covering is in place. Proper proportions are one and one-half pounds of parawax mixed thoroughly with one gallon of gasoline.

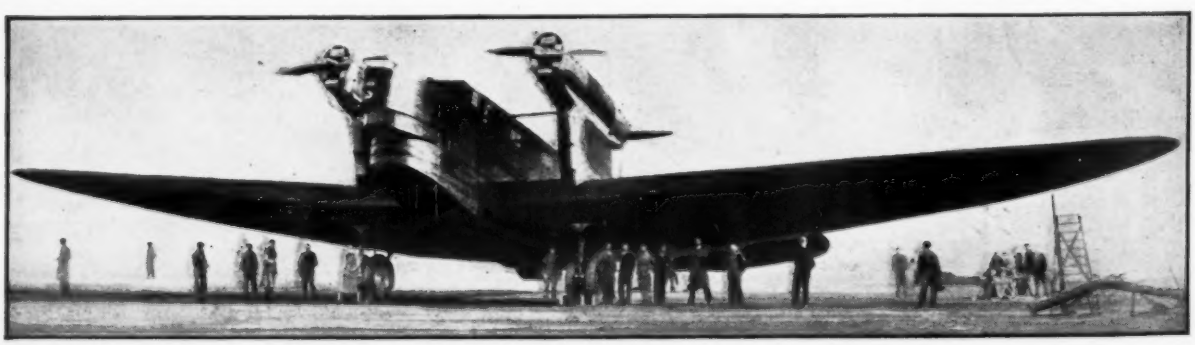
A wood covering for the wings of an airplane is certainly not advisable. The machine would be entirely too heavy to operate. The only wood which should be used in the stressed members of the frame is spruce. In regard to the skids however, ash should be used so that it may be easily bent as well as stand up under hard treatment.

Next we have some questions from Roger Beaupre of 121 Locust Street, Holyoke, Mass. It looks as if he were compiling a dictionary of aeronautical terms.

Question: Is balsa better when cut with a circular saw or knife cut?

Answer: Just what do you mean by "better"? We will assume here what you mean is whether the surface of the balsa is smoother when cut with either one of these two machines. A circular saw with set in the teeth, will cause a very rough and feathery surface on the wood. The knife cut will be smooth; however, it is difficult to cut balsa with a knife without having it curl. A good method which is

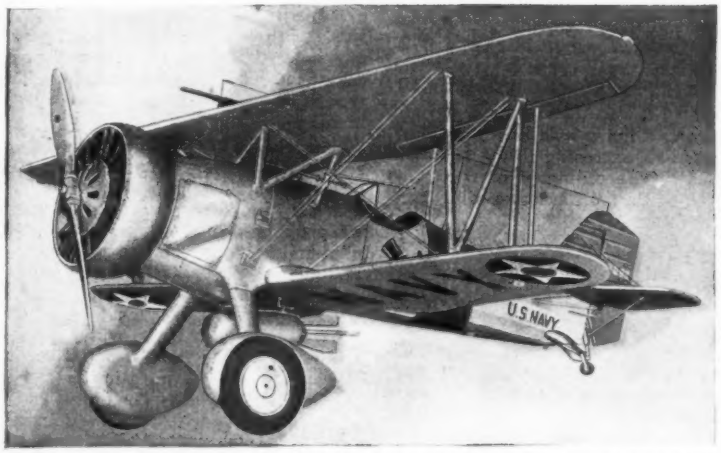
(Continued on page 47)



The latest and largest French bomber; a 16 ton, four engined 3360 h.p. all-steel monoplane with a top speed of 198 m.p.h. It is called the flying fort because it can carry 7 tons of bombs and has six machine-guns to ward off attacks of pursuit planes. These are placed at points of advantage along the eighty-two foot fuselage so that there are no blind spots

You Model Builders who want the last word in Scale Design will welcome these new

IDEAL SuperDetail 100% Scale Exhibition Flying Models



Actual Photograph of the Ideal "SuperDetail" Curtiss "Goshawk" Fighter
Wing Span—23⅜ in. Length—16 3/4 in. Weight—3⅜ oz.

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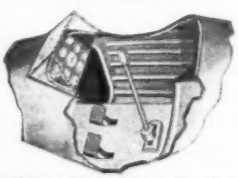
Curtiss "Goshawk" Fighter



"Close-up" view of the cockpit of the "Goshawk" showing the Control Stick, Foot Pedals and Pilot's seat. These controls operate the Ailerons, Rudder and Elevator just as they do on the real airplane. This model has everything; even the radio aerial and camera gun mounted on top wing!

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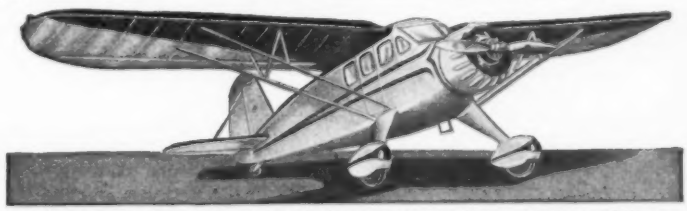

Actual Photograph of the Ideal "SuperDetail" Stinson Reliant Airliner
Wing Span—32 5/16 in. Length—21 1/2 in. Weight—2 1/2 oz.

Stinson Reliant Airliner

WHAT a model! Beautiful, clean-cut lines exactly like its popular original. You will be proud of this model in any company. Ailerons, Rudder and Elevator can be set in any position desired for flying, and controlled by cables from cabin. Entire model designed in exact 3/4-inch scale, every detail accurate and with weights shifted for flying to compensate for differences in the center of gravity. Kit contains big, 34" x 44" plan, showing every operation. Every stick and fitting needed in building is included, and many special parts designed for these "SuperDetail" Models. If the very latest ideas in model engineering interest you, this is the model you should build next. It will make a real hit in any company, with its glistening yellow and black colorings, and "SuperDetail" features not obtainable in any other models. Complete kit to build this beautiful model, with all the detailed features, sent you fully prepaid, for only .....

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On the Frontiers of Aviation

(Continued from page 15)

with a full load in sixteen seconds. A bombing compartment, built in the bottom of the fuselage, can carry 2-1100 pound bombs. These are hoisted into place by an ingenious hoisting device designed by Curtiss-Wright engineers. The internal bomb compartment makes it possible to carry a very heavy load without interfering with the plane's speed. In case small bombs are desired, bomb-racks have been installed on both lower wings so that 9-100 pound bombs can be hung on bomb-racks under each wing. In addition, 2 bombs may be placed in the internal bomb compartment, giving a total load of 20 bombs.

Tests at St. Louis with this load, indicated a climb exceeding 1000 feet per minute, a service ceiling of over a thousand feet, and a top speed exceeding 175 miles per hour.

This plane is powered by two 700 horsepower Wright "Cyclone" engines of the same type used by Col. and Mrs. Charles A. Lindbergh on their long-distant flight.

In addition to the heavy bomb load, the BT-32 Bomber is equipped with 5-30 caliber machine-guns, one of which is located in the turret in the top of the fuselage, to the rear of the pilot seats. Another gun is located in a turret in the top of the fuselage, midway between the trailing edge of the upper wing and the tail surfaces. The gunner who occupies this position sits on a revolving seat so that it is possible for him to change the position of the turret very quickly and with the greatest of ease. To the rear of this gun turret, another gun is located in the bottom of the fuselage. There is also a machine-gun on each side of the fuselage. Directly to the rear of the gunner, is located an aerial mapping camera for use in mapping expeditions.

The bombardier's compartment is located directly to the rear of the pilot's seat in the bottom of the fuselage. This compartment affords the bombardier most excellent vision. This cockpit is equipped with an altimeter and air speed indicator in order to assist the bombardier in accurate bombing.

Without making any changes in the construction of the Curtiss-Wright Condor Bomber, 12 litters may be installed to carry wounded when it is desired to use the bomber as an ambulance.

Because of the extremely large fuselage of the Condor, it makes an excellent ambulance. A large door is provided so that the wounded can be carried in and out of the ship with the greatest of ease. Because of the large width of the fuselage, ample room is provided for nurses and doctors to work between the litters and take care of the wounded while in flight.

The ship is also equipped with benches for seating 24 soldiers with full field equipment, when it is desired to use the BT-32 as a troop transport.

The ship carries 728 gallons of gasoline, which provides a range of 1200 miles. 300 gallons of gasoline are carried in 475 gallon tanks located in the upper wing. In addition 4-107 gallon gasoline tanks are located in the fuselage. The fuselage is of welded chrome-molybdenum steel, covered with fabric. The length of the fuselage is 49 feet, 11 inches. The height of this new bomber is 16 ft., 3 in.

An indication of the accessibility of all parts, and the ease of inspection is the fact that the wing and tail surfaces are provided with 125 inspection openings.

The entire tail assembly is one complete unit and is adjustable as a unit. The stabilizer, elevator, fin and rudder adjust for incidence as a complete assembly. The connection between this tail unit and the fuselage proper is accomplished by Fafnir-hinged, ball bearing units at the rear end of the upper fuselage longerons. This type of assembly offers the most rigidity in tail construction.

The location of the pilots in the extreme nose of the fuselage affords most excellent vision. Front and side windows slide fore and aft, providing through ventilation when flying through rain or snow. Both pilot and co-pilot seats are adjustable, so that a large or small man can fly the ship without discomfort. The foot pedals are of the stirrup type which can be adjusted when the plane is in flight, without necessitating taking the feet from the controls. Dual wheel controls are provided from a single control column. The brakes are applied with a hand parking lever, differentially controlled by rudder and pedal action.

Two landing lights and one red fog light is located in the nose of the ship.

Under the supervision of George A. Page, chief engineer of the Curtiss-Wright Airplane Company, this latest development, the Curtiss-Wright Bomber BT-32, has been built in a comparatively short period of time. Project engineer was Kendall Perkins.

The U. S. Army Air Corps is now using two Curtiss Condor transports. In all, there have been more than 34 Condors sold throughout the United States and Europe.

Build a Solid-Wood Scale Model of the Curtiss Condor Bomber BT-32

Draw side elevation of fuselage on block of wood (white pine or balsa) and cut around outline with jig saw. Then draw plan on piece and cut once more. Using a chisel, pen-knife, or razor blade, round out the fuselage, referring constantly to its cross sections.

Next cut out the two gun turrets from solid wood and ambroid (glue) in place on top of fuselage. Halves of pins may be inserted in turrets as machine-guns.

The wings and tail surfaces are constructed in much the same manner.

The top wing is made in three sections as shown on plan. The two lower wing sections should be cut to shape, disregarding the fillets, which will be made later. Cut plan of wings with razor blade and then shape out the airfoil section (cross-section). Use coarse and then fine sandpaper in smoothing out the wing sections. Be sure the surfaces of the wings are very smooth.

After the wings are completed, shape out the tail surfaces (fin, rudder, stabilizer and elevators) in same manner.

Make the nacelles next. Shape out their

profiles first and then the top elevations. Round them out with a razor blade, noting cross sections. If you desire to construct a retractable landing gear, hollow out a section in bottom of nacelle where wheel and struts will retract, (see side elevation on model plans).

Carve out two three-bladed props with razor blade, getting dimensions from front view. A small pin may be used as shaft.

Make the eighteen bombs next. Be sure to make them all the same size.

Go over all parts of the model with coarse and fine sandpaper, making them ready for doping.

Paint fuselage and nacelles a dark blue and other surfaces a bright yellow with exception of rudder and wing insignia. They will be colored yellow and blue, the black on the plane indicating the blue. After paint has completely dried, begin the assembly.

Join nacelles to wing first. Cut away part of wing where nacelles will be; then ambroid the four resulting wing sections to nacelles.

Next ambroid lower wing to fuselage. Lay blocks under wing tips to retain correct dihedral angle. Go over connections once more with ambroid after first application has dried. Then, with the use of putty, shape out wing fillets on model.

Connect the tail surfaces to the fuselage with the use of ambroid.

After connections have thoroughly dried, begin the assembly of the top wing. Ambroid the three sections together with the correct dihedral. Let them stand until joints are dry and then hold the wing over the fuselage in required position with the use of blocks. BE ACCURATE. Then connect all wing struts cut from strips of wood. Black thread may be substituted for wire in bracing the wings and tail units, which is done next.

Connect up landing gear, including tail wheel, as shown in three-view. Attach bombs and props. Paint wing struts blue and touch up all other parts of the model.

The model will then be completed.

Build a Solid-Wood Scale Model of the Grumman Fighter FF-1

The Grumman fighter is one of the newest additions to our Navy. Much secrecy surrounds the sturdy little plane and official information on it is almost unobtainable. The three-view drawing of the FF-1 has been drawn up from present available information possessed by the writer. It is undoubtedly the first time a three-view of the Grumman FF-1 has been published.

The construction of the model is very similar to the procedure used in building the Curtiss Condor Bomber.

Cut fuselage to shape, making compartment for retracted landing gear as shown in cross section. The gear may be hinged to the fuselage with wire. Note that fairing should be built on landing gear to cover up compartment in fuselage, which is not entirely done by the wheel when in retracted position. Also note that the long shock strut is hinged at axle of wheel. Allow plenty of room in fuselage for shock strut to slide up and down. The landing gear may be held firmly in down

(Continued on page 36)

Building the Hanriot-Biche Pursuit

(Continued from page 16)

slightly until any one of the blades point directly up.

Assembly

Make the motor stick of 3/16" x ¼" hard balsa and put the propeller shaft through both propeller hangers. Then put the shaft through the propeller, bend it back and cement it into the hub. When this is dry, carve out the small cone for the hub and cement it in place. Now put the motor stick through the opening in the body and put on the rubber bands which serves both as a shock absorber and preventive for keeping the propeller from shattering the tail in a head-on impact. The perspective shown on drawing No. 3 will give you a clearer arrangement of the shock absorbing assembly.

Before assembling, first give the fuselage, pants, propeller and booms one coat of banana oil and then sandpaper to a fine finish. Start assembling by cementing the booms onto the center section wing and then the right and left wings to the booms. Give the wing a 1½" dihedral at both tips. Then cover both tails and cement them onto the ends of the booms. Now cover the wing, put on the landing gear and tail skid. All the scale effects may be put on by following the pictures and small three view published in this magazine.

To tighten the covering, spray on ordinary water. If desired, give the covering one coat of banana oil after the tissue has dried.

If model is made according to plans, it will need only four strands of ⅛" flat rubber for power. But if the model is heavier, then power with four strands of 3/16" flat.

Make an "S" hook, and crank the propeller up with a geared winder.

If in flight the model dives, warp up the elevators; if it stalls, warp them down. Due to propeller torque, the model may tend to turn over on one side. In that case. put a small weight on the wing that goes up.

If any other difficulties arise in flying the model, kindly write to me or the editor of this magazine and your problems will be cheerfully answered.

Material List

2 strips 1/16" x 1/16" x 36" balsa
4 strips 1/16" x ⅛" x 36" balsa
1 strips 3/16" x ¼" x 13" balsa motor stick
1 strips 1/16" x ¼" x 15" bamboo
1 sheet 1/16" x 2" x 36" balsa
1 sheet ¼" x 2' x 18" balsa
1 sheet Japanese tissue.
2 pieces ⅞" x 2½" x 7" soft balsa body
3 pieces ½" x 1" x 3" balsa prop. blocks
2 small propeller hangers
2 ft. medium wire
3 small washers
1 ounce ambroid and banana oil
4 ft. ⅛" flat rubber
1" square thin celluloid
Thin cardboard for patterns.

How the Aeroplane Was Created

(Continued from page 22)

Outstanding among the biplanes was that of A. V. Roe, who had started his experiments in England with a triplane of conventional tractor type, somewhat similar to the Bleriot Monoplane. Roe's machines became known as the Avro. He steadily improved upon them, his work being characterized by the incorporation of well proven design. An interesting model was his early military type tractor.

Blackburn, also of England, showed a military aeroplane this year, an outstanding feature of which was its all-steel construction. The use of this metal was becoming more and more popular. In this model, even the sides of the fuselage were sheets of steel and all of the wing construction of the same material. (This model is shown in an accompanying drawing.)

Nieuport of France brought out a very distinctive type of racing monoplane of most excellent streamline design. Even the motor in this model was entirely enclosed and as in the Avro model, the undercarriage was equipped with a semi-elliptical spring for absorbing the shock of rough landings; in contrast to rather complicated spring action generally employed heretofore.

Almost simultaneously, Caudron of France developed another monoplane type of fine streamline, but of smaller proportions than the Nieuport. The motor of this machine was exposed to the air, being an air-cooled type, but as a general rule, designers were making the most use of streamlining.

For all the rapid improvements made in design and construction, there was one outstanding model in this group which though little known, deserves our consideration. Levavesseur's Antoinette models were certainly of excellent design and performance, but he fairly outdid himself in his military model built in this year. From the accompanying illustration, its general features may be observed. The wheels enclosed in streamline pants, sheet steel body in which the pilot was entirely enclosed, were of course great advances in design, and of prophetic trend was the scheme of internally bracing the wing structure, which eliminated resistance from exposed bracing wires.

Of course there was much progress in flying in 1911 also and as the popularity of flying grew, it became more evident that the aeroplane had a very definite place in the field of transportation. An indication of this came with the first trans-continental flight by Cailbrith P. Rogers in this country, from New York City to Pasadena, California, with an elapsed time of fifty-nine days of which only eighty-two hours were spent in the air. Contrast this with today's magic of sixteen to eighteen hours and made on daily schedule time.

On March 24th, Charles Sommers gave further proof of the trend of progress when he carried aloft twelve passengers in a machine of his own design, a real feat when we consider those frail ships compared to the ones of today. George Fourney, also set a new endurance record of

thirteen hours, seven minutes and fifty-one seconds, really quite an advance over the previous mark.

In September, Postmaster General Hitchcock inaugurated the first airmail in the United States, when mail was flown from Nassau to Mineola, Long Island, thus setting the cornerstone for the vast system of coverage existing in the United States today.

Jules Vedrines, the famous French pilot who had previously made the circuit of Great Britain, flashed across the skies to a new speed record of 105 m.p.h. in 1912 in a remarkable new type of flying machine, the Deperdussin. This machine was streamlined to a remarkable degree and was of monocoque construction. At this point, it is pertinent to mention the fact that the idea of streamlining aeroplanes became a governing factor in design and designers, as soon as they realized the benefits derived from such design, began to incorporate it quickly in their new machines. Although head resistance was a known quantity before this time, it is most likely probable that this was simply neglected until the desire for greater speed caused these factors to be considered.

Roland Garros, later to earn undying fame as a war aviator, startled the world in 1912 by reaching an altitude of 16,274 feet and for the first time using oxygen for sustenance at that rare altitude.

Lincoln Beachey, an America, during this same period had been performing some wonderful acrobatics in his Curtiss biplane and was rendering a real service in showing the way to mastery over the idiosyncracies of the aeroplane, but Pegoud the equally adept Frenchman went him one better, when he performed the first "loop" and then the first half outside loop. These feats were not merely stunts, but had a definite place in flying, since they taught the pilot a method of extricating himself if accidentally he were subjected to such a condition.

In this year, the Nieuport machines came into further prominence in creating new speed records, and their streamlining, of a high order, was soon copied by other designers.

With flying having reached the point where pilots were looking for new worlds to conquer, enthusiasm was kindled anew with the prize offer by the London Times for the first aeroplane to cross the Atlantic in less than 72 hours. This perhaps gave Rodman Wanamaker his idea as previously mentioned. At any rate little was done, and aviation seemed to have been lulled, at least until 1914 when the World War burst in all its fury upon a startled world. Just how the aeroplane played its part and became a real factor in changing the method of warfare, shall be shown in the succeeding chapter.

On the Frontiers of Aviation

(Continued from page 33)

position by inserting a small pin through hole in upper tip of shock strut, into a part of the fuselage.

Make the wings and tail units next. Then the prop and other miscellaneous parts. The cowl around motor may be bent from a fine grade of cardboard.

Assembly comes next. Join lower wing and then upper wing, applying plenty of ambroid. Following comes the tail units, then the dummy motor and prop. Ambroid cowl around motor. Put on cockpit enclosure made from wood strips and isinglass. Connect up tail wheel and other remaining parts.

Dope the plane next. The fuselage should be silver, the wings and tail surfaces yellow, the motor black, landing gear, cowl and prop, silver. All numbers should be black as well as "U. S. NAVY." Paint band around fuselage black, also insignia on side of fuselage. The wing insignia should be red, white and blue, the small circle in the middle red, the star white and the rest blue. Paint wing struts yellow. Touch up all connections and the plane will be finished.

Is France Supreme in the Air?

(Continued from page 7)

To get the fighting qualities in the new machines, the two-seater was frankly abandoned; the new buses are three, four and even six-seaters. Usually they have a couple of machine-guns forward above the upper wing, another pair aft, the pilot's seat being low down, forward, with a navigator's seat beside it and bomb-racks or photographic equipment behind them. They are all-metal and, here's an interesting point, they are all made so they will knock down in five or six standard sections which can be shipped around in packing cases and assembled anywhere with unskilled labor. This last requirement was put in because of France's great colonial empire, second only to the English, which will have to be defended from the air in the event of any unpleasantness.

Finally, practically all these ships will do about 180 miles an hour with full load and there have been rumors that some of them mount a new type of gun—a gun that fires a small shell instead of a machine-gun bullet. With the ordinary bullet you have to hit the enemy in a vital spot, but a shell will do serious damage anywhere it lands.

But the most interesting and distinctive feature of the new French fighters, is their tails. They had to be capable, you remember, of shearing right through a screen of pursuit and getting at hostile bombers. Now the weak point about most fighters is that a hostile pursuit ship can get on or under their tails and it's good-bye. The French designers set out to get rid of these blind spots at any cost, and their way of getting rid of them gives the new machines their distinctive appearance. In the Breguet the whole tail assembly is carried on a single longeron which projects from the fuselage low down, giving it a curious rat-like appearance. In the Nieuport, the fuselage behind the rear machine-guns narrows to a T-section with the down-stroke as thin as paper. In the Caudron and SPCA, the fuselage is placed center and the tail carried on a pair of outriggers from the sides.

So much for the new fighters. It was into the pursuit ships, however, that the greatest ingenuity of the designers went. The first thing that strikes one about them is how much alike they look, and how different from any other pursuit craft. The likeness is due to the work of the Bureau of Inventions, which went into the whole problem and laid down certain basic principles of design. One of these was no external bracing wires, another was no radial air-cooled motors, and a third, nothing but monoplanes: all points making for speed, for you must remember that these pursuit ships are designed not to keep even with 190 m.p.h. bombers but to run them down from behind.

Within these limits, the designs vary a good deal. They fall into two general types; the high-wing monoplanes—Loire, Mureau and Nieuport; and the low-wings—Hanriot, Dewoitine and Morane. The high-wingers all have gull-wings with a slight dihedral and a pair of struts running to the bottom of the fuselage, radiator underneath and landing gear supported on a pyramid of struts. Their power plant is the 600 h.p. Hispano Xbrs motor.

The Loire ship was a comparatively poor job and did not get past the service tests in competition with the others. The Nieuports turned out a high-altitude fighter that only does 190 miles an hour at 6000 feet, but hits it up to 224 miles an hour at 18,000 feet, and at 25,000 feet, above the ceiling of most bombers even when they're flying light, is still able to go 220 miles an hour. But the Mureaux was the prize pup of the litter. She is an all-metal job of beautifully clean design and when she took the air on her trial trip, made no less than 232 miles an hour under full military load. When that ship swooped in from her trials, you could hear a sigh of relief all over Villacoublay. At last France had a pursuit ship that would catch the fast bombers.

But better was to come. The low-wing pursuit ships were longer in getting ready than the high-wings, as the design was less familiar. They have wings of what they call the Zanonia shape in Europe—a sort of flattened D, narrowest at the tips. The Dewoitine was a high-altitude fighter which was a sort of low-wing version of the Nieuport. She made 197 miles an hour at 5000 feet, but 226 at 20,000 feet. The Morane ship braced its wings from the top

of the fuselage and made the landing gear retractable to get wonderful climb and a top speed of 232 miles an hour.

The Hanriot was the most interesting of all. This firm boldly kissed all preconceived ideas good-bye and built a type of ship that had not been seen since the middle of 1915—a pusher pursuit plane. They got rid of the radiator drag by mounting the cooler right up in the nose where the motor of the average pursuit ship is placed, swung the tail out on a couple of outriggers, made the wing thick enough to carry all its bracing internally, and by that token, managed to install a fully retractable landing gear. Great idea, especially as the motor acts like a coat of armor to protect the pilot from attack from the rear. But would it work? The answer is that it did—and how? When the new Hanriot took the skies, she promptly cracked out 240 miles an hour with military load—and this was only a test ship, which did not attempt to pull in her landing gear on the test. The answer to the French defensive problem had been found at last.

As for the bombers, most French bombers on the whole fly like trucks and are about as graceful. The French theory of war in the air is that it is all part of one problem; if you don't get command of the air you are going to lose excessively in trying to push bombers through, no matter how fast or well-equipped they are; if you do get command of the air, it won't matter much about the speed of the bombers. Thus they neglect speed in bombing planes and build for two qualities only—weight-carrying capacity and strength. Of course, for day bombers and light raids, the same type of all-around fighters are used that do the observation work. They are supposed to be able to take care of themselves against pursuit craft, and if it's true that they have a shell-gun, they will certainly make an awful mess of any pursuit ships that come in on them.

The leading bombing types are Farmans, Wibault-Penhoets and Dewoitines. The Farman is a monster—a four-motor monoplane, with the motors mounted in tandem in a couple of nacelles under the wing, and a useful load of seven tons; radius of action enough to carry it from Paris to Berlin and back, and six machine-guns, two of them in an armored turret forward. She only makes 140 miles an hour, but with armament like that, speed isn't likely to be important. The Wibault-Penhoets are three-motored, low-wing monoplanes, not unlike the Douglas, which can only walk off with a ton of useful load, but has a much greater radius and a top speed of 156 miles an hour. The Dewoitine is the Emerald, returned to the shops for redesigning, a tremendously fast ship which is likely to emerge with about the same load and higher speed than the Wibault-Penhoet.

All told, the country boasts of something like 2200 first-line fighting planes, mostly the new all-purpose fighters and fast pursuit ships. Some effort is being made to build up the bombing section also, but the main concentration is now on pursuit. *(Continued on page 45)*

Air Ways Here and There

(Continued from page 25)

surface of one of Florida's land-locked waterways at a great rate of speed. Mr. Booton resides at 60½ Patton Avenue, Asheville, N. C. After looking at this picture there is no doubt that this model is a very unusual flier. As many of our readers know, the plans for this model appeared in a previous issue of Universal Model Airplane News.

MODEL NEWS FROM OTHER COUNTRIES

Australia

We have news from Mr. Ivor Freshman of the Model Flying Club of Australia, which indicates great progress in that part of the world. The Australian boys have been increasing their flying time at a great rate. You know, they hold all of their contests under official National Aeronautic Association rules. This allows their records to be compared on an even basis with American records. Following are the up to date Australian official model airplane records:

OUTDOORS

J. Brown, Albury, R.O.G., Class C—Fuselage. 52 min., 40 sec. (World record applied for).

G. Ratcliffe, North Strathfield, N.S.W., Class D—Stick Tractor H/L. 28 min., 27 2/5 sec.

G. Ratcliffe, North Strathfield, N.S.W., Class C—Flying Scale "Cessna," 40 sec.

INDOORS

E. G. Leighton, Malabar, N.S.W., Class C—Fuselage R.O.G. 3 min., 33 sec.

J. Jago, Malabar, N.S.W., Class D—Stick Tractor H/L. 7 min., 45 sec.

Picture No. 9 shows a Polish Fighter taking off. This is one of the best action photos of a model that has been sent to the magazine. Model builders will appreciate the difficulty in snapping a ship at this stage of a flight. The model was built by Bill Hampson of the Bondi Branch and it averages thirty seconds duration. (We wonder if Hampson is any relation to the editor of Universal Model Airplane News. He has the same middle name. Your editor says that he has never known a Hampson who is not related to him. How about it)?

Picture No. 10 shows J. Jago of the Malabar branch. He is holding the indoor endurance ship with which he established an indoor record of seven minutes, 45 seconds. He was awarded the trophy shown in the picture. Our Australian friends have a difficult time making endurance records equal to American boys because of the fact that the places in which they fly are about one-third of the height of ours. American indoor records have been established in armories with a height from floor to roof of about one hundred and ten feet.

Sixty competitors recently flew for the Coote and Percy Marks trophies at Centennial Park. The Angus and Coote cup was won by B. Eaton with a stick tractor, which made a flight of three minutes, thirty-five seconds. The Angus and Coote Flying Scale trophy was won by G. Radcliffe with a forty-two minute flight, made by a Cessna monoplane. This is a new record. The Percy Marks cup (R.O.G.), was won by B. Martin of Neutral Bay with a five minute, thirty-three second flight.

England

We have considerable news from England this month. Up to this time the English model builders have kept themselves very much in the dark regarding their activities, so we take special pleasure in telling you something of what they are doing. Mr. Wilfred Bowen of 127 Finchley Lane, Hendon, London N.W.4, sends us picture No. 11 which shows Arthur Yeomans and some of his models. You can see that the model hobby in England is not confirmed entirely to juniors. Adults are particularly interested in this sport. Perhaps some of the older people in this country will wake up to the fact that models are not toys, but a very valuable and inexpensive means of studying aviation, and particularly aerodynamics.

Mr. B. K. Johnson, competition secretary of the S.M.A.E., has been kind enough to contribute some very interesting pictures and information which is centered mostly around the 1933 International Wakefield Competition.

Picture No. 12 is of especial interest as it shows the Gordon Light American Wakefield entry on a trial flight at the Fairey Aerodrome. This ship placed third with two minutes, twenty-three and two-tenths seconds.

Picture No. 13 shows R. Galloway's six foot, nine inch model in full fight. It won the Victoria Competition on May 13th, 1933, which was held at Wimbledon, England.

We are fortunate in being able to publish picture No. 14 which shows J. W. Kenworthy, with his model which won the Wakefield 1933 Competition. It was timed for five minutes, twenty-one seconds until it went out of sight. It has a span of forty-eight and one-half inches and weighs two and four-fifths ounces.

Another branch of model activity which is in full swing in England, is the flying of gasoline-powered ships. Picture No. 15 shows Mr. Johnson's gas model, "Condor." It weighs four and one-half pounds and is powered with an engine of fifteen cubic centimeters displacement. As gas model fliers know, landing gears of such ships usually suffer the most damage. Mr. Johnson has endeavored to eliminate some of this trouble by doing away with landing gear struts and lowering the belly of the body so that the axle fastens directly to the body itself. This arrangement works exceedingly well.

We have news from Mr. J. G. Allen of Lincoln Chambers, Banbury, Oxon, which may be of interest to scale model builders of this country. He says, "It may be of interest to you to learn that an exhibition of model aircraft and other matter aeronautical, is being arranged to visit the leading town (London) of Great Britain during the winter season of 1934-1935. This exhibition has been arranged to generate a sense of 'air-minded-ness' and to give amateur model builders an opportunity to display their work. We would be delighted to have a half-dozen American boys who would care to send over one model each, of leading American machines,

so that they may be displayed with those I have already collected. These models should be non-flying and built to a scale of one-third inch to a foot."

All those young men who would care to send over models to be displayed will kindly communicate with the editor.

CLUB NEWS

Air Cadet Wesley Wilkerson of 114 West Glendon Way, Wilmar, Cal., sends us picture No. 16. This picture fooled your editor very much at first. He was about to discard it as a picture of a large plane (you know, models have precedence over large ships in the "Air Ways" column), when he noted from the accompanying letter that this was a picture of a twenty-inch, solid scale Howard Racer. The effect of a large ship was obtained by taking the picture very close to the ground. The hangars in the distance are real and are actually part of the Los Angeles Airport.

Wilkerson is a member of a new nation-wide model club called the "Air Cadets of America." It is divided into squadrons. Wilkerson belongs to the Alhambra Squadron, No. 10, which is under the direction of Mr. Louis Innwood, a pilot and operator of the Cycolplane School of Flying. A contest was held recently in which five southern California squadrons competed for a trophy donated by Mr. Lockheed, designer of the Lockheed airplanes. The squadron from Los Angeles Polytechnic High School won the trophy.

Bamberger Aero Club

A new American model record was established by Raymond Steinbacher of Ridgefield, N. J., at the Bamberger Aero Club's Fifth Annual Indoor Contest which was held in the Newark Armory, March 31st. Raymond is practically a beginner, building models for only one year. His model, a duration class B type flew for nine minutes, seven seconds. The wings were covered with microfilm and the tail with tissue. (This is a good idea, since most microfilm-covered tail surfaces at the contest were badly warped). Here are the winners of the first four events:

R.O.G.

Herbert Greenberg	4 min.	51½	sec.
August Ruggeri	3 min.	45.2	sec.
John Romanowski	3 min.	42	sec.
William Sherwood	3 min.	37	sec.

DURATION

Raymond Steinbacher	9 min.	7	sec.
John Romanowski	7 min.	20	sec.
William Sherwood	6 min.	1.6	sec.
Walter Skokna	4 min.	6	sec.

FUSELAGE

Herbert Greenberg	5 min.	10.6	sec.
August Ruggeri	3 min.	35.4	sec.
Alton Du Flon	2 min.	55	sec.
Raymond Steinbacher	2 min.	34	sec.

FLYING SCALE MODELS

John Zeboyan
Anibal Ferreira
Alfred D. Marinaro

The highest point winner of both indoor contests will represent the Club at the National Meet in Akron, Ohio, in June. Here is the score so far. Greenberg, 35 points, Ruggeri 25, Steinbacher 23,

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The Development of the Fokker Fighters

(Continued from page 11)

wrecked, its faults might have been overcome, but the races were held before Fokker had a chance to repair the damage.

On its test flight, Fokker took along his mechanic, since the conditions of the race flight would be more approximated and he could tell more accurately just what was to be expected. When all was in readiness, Fokker gave the order to cast off, and taxied out in the river next to Johannistahl. After a run of several hundred feet of careful throttling, Fokker lifted the boat off the water and soared away like a great bird. A large circle brought the plane over the river and into the wind once more. Approaching the landing area, Fokker cut down the throttle and waited for the ship to slow up and settle. Much to his surprise, however, when he cut the throttle the tail dropped like a rock. Turning on the gas once more, Fokker climbed the W.I away from the river and sought the clear sky above to think out his problem.

Again Fokker approached the landing place, and again as soon as he closed the throttle, the tail dropped and the plane threatened to stall. Fokker had designed too little stabilizing area in the tail assembly and not enough elevator to force the nose down.

In the third try at a landing, Fokker warned his mechanic to watch out for a crash. Doing his best to save his mechanic's neck and well as his own, to say nothing of the W.I, Fokker came into the landing area with full throttle on. He flew as closely to the water as he dared at this high speed, then closed the throttle and hoped that the planking on the hull would hold.

It held, but as the tail slapped the water, it bounced and the bow dug in deep carrying the occupants with it. Luckily for the German Air Service, Fokker was not hurt, and his mechanic escaped serious injury. However the W.I was ruined before the launching crew could save her.

Fokker's second attempt at the seaplane business met with somewhat more success although the general design of the W.II was almost identical to the W.I. The new plane was a tractor version of the W.I and had the same wing arrangement and an identical empennage.

The major change of the W.II was to tractor type. A fuselage reminiscent of the 1909 Bleriot XI monoplane, carried a vertical motor of about 100 h.p. A large radiator on each side of the fuselage cooled the motor sufficiently.

Just behind the engine and fire wall, the pilot's controls were located, and behind the pilot was room for one passenger, who, according to the picture shown here, had perfect freedom aft and could walk to the end of the covered portion of the fuselage. Directly underneath the stern post, a tail float of small dimensions protected the empennage from the water. Struts terminating at the tail float ran upward to support the elevator which was of the balanced type used on the 1914 monoplanes. An undivided rudder of gen-

erous dimensions completed the tail assembly.

The cellule of the W.II was very interesting. In the upper wing, the more practical ailerons replaced wing warping, but dihedral was again placed in this plane. The lower wing, slung under the fuselage, Bristol fashion, was again about one-third of the upper plane in span. Directly below the fuselage, the lower wing was left uncovered to provide the pilot with good visibility downward. The wing arrangement made the W.II a decalage biplane, but efficiency was lost in not staggering the planes, especially in a slow speed machine of this type. The method of interplane bracing was essentially the same as that of the W.I except for the revised aileron wiring.

Two large pontoons supported the machine upon the water. A series of steel struts ran from the pontoons to the lower wing center section struts and to the compression members of the same plane, where the interplane struts also terminated.

Little is known of this machine, and wartime and pre-war records fail to reveal its performance or details outside of those presented here. It did, however, serve as a link between the W.I and the W.IV which will be described next.

The gap between the W.II and W.IV seaplanes was one of several months during which the Short Brothers of Rochester, England, introduced their "folder seaplane." This English product evidently served as an inspiration for the Fokker W.IV, since the picture of the latter shown here is remarkably like the Short. However, Fokker let his ability play with the design until a very efficient and practical arrangement was created.

The Fokker W.IV seaplane is a two-place biplane of unequal span. Both planes are built in two panels, each panel made up of a framework of two spars with 20 ribs in each upper panel and 14 ribs in each lower panel. Two pairs of interplane struts in each panel are connected to steel fittings bolted to compression members, running parallel to the sixth and eleventh ribs, counting from the center. Center section struts are six in number, forming three inverted "V" shaped mountings, the points of which carry the upper plane joint fittings. The upper plane has a half circular cut-out over the cockpits to provide good view up and over the wing.

In the W.IV, dihedral was omitted perhaps because of the stabilizing effect of the large floats. For some reason, Fokker returned to the wing warp control in the W.IV.

Steel tubing again came into use as material for the fuselage skeleton. Four longerons and a number of welded uprights were the main members. Two cockpits were let into the top of the body just behind the rotary motor, and were of the usual curved top type, well padded.

As can be seen in the picture, the Fokker W.IV was quite "long legged." Pontoon struts were made of streamlined steel tubing welded to the fuselage and joined to fittings on the floats. Wing bracing terminated at these float fittings, making a rigid system of bracing. The floats were separated by two members running directly across their upper surfaces. Three steel steps were welded to the front strut to provide access to the machine.

The floats on the W.IV were of the simple flat-bottomed design. Their framework of selected wood and bulkheads was covered with plywood well calked and varnished. Since the main floats were large enough to keep the tail out of the water, no tail float was included in the design. Elevator and rudder design was the same as the type used on the Fokker monoplanes, contemporary with the W.IV.

For a power plant, Fokker chose a Le Rhone of about 100 h.p. This power plant was well cowled in by aluminum stampings. How well this ship flew is not known today, because it was timely enough only to find mention in a few technical news items. Its performance was of course poor, judging from modern standards, but it was good enough to be used as an instruction ship for naval flyers at

(Continued on page 45)

The Aerodynamic Design of the Model Plane

(Continued from page 23)

The effective horizontal area of the propeller is equal to *one-half* its projected area. This is because it is spinning and is in an effective horizontal position only half the time. The other half of the time it is effectively vertical.

Thus it is apparent that the smaller we make the propeller, the greater longitudinal stability the plane will possess. It is often necessary for the sake of good flying qualities to make the propeller fairly large. In such cases the longitudinal righting or corrective tendencies must be increased to sufficient proportions. Enlarging the stabilizer, placing the wing high and keeping the weights low, are some of the ways you can enhance these corrective tendencies.

Knowing that the propeller area has a detrimental effect, it can be readily seen also that the farther out in front of the wing the propeller is located, the more undesirable influence it will have. In other words it will have more leverage to resist the corrective forces just as the stabilizer has more leverage to correct displacements when the moment arm of the tail is long.

Thus we can summarize our findings with two simple rules:

1. Make the propeller as small as possible and yet have good flying capacity for your plane.

2. Keep the distance from the wing to the propellers as small as possible, even if you have to add weight to the nose in order to make it possible for the wing to be placed farther forward, thus shortening this distance (N).

This reasoning is the basis for one expression in the formula for stabilizer area, given on page 45 of the June 1933 issue. The expression is as follows:

$$A_s = \frac{A}{3M}\left(\frac{3C}{2} + N\right).$$

In this part of the formula, (A) the wing area, is proportional to (A_s) the stabilizer area. As you know, the larger the wing area, the larger the stabilizer area should be. Also you can see that the larger (C) the chord, or (N) the distance from the center of the wing to the propeller, the larger value (A_s) will have. The stabilizer area must correct the combined effect of (C) and (N) so (A_s) is proportional to (C + N). The average numerical value of (N) in any plane is usually 50% greater than (C), so in order to give them each value numerically in the formula, we write the expression (1.5C + N) or $\left(\frac{3C}{2} + N\right)$

For instance, in an average plane, C = 4" and N = 6". Substituting in the expression, we have, $\left(\frac{3 \times 4}{2} + 6\right) = (6 + 6)$.

Here you see they produce equal values.

(M) in the formula is the stabilizer moment arm. It is put in the denominator below the line because the stabilizer area should be inversely proportional to it; that is, if (M) is large, the stabilizer area may be correspondingly smaller. Then also, it is the relative size of (C) to (M) and (N) to (M) that determine the effect of (C) and (N) on the plane when in flight.

This is a little deep, but it enters the actual problem and will provide you with a little healthful mental exercise, besides making the study of mathematics easier for you.

The (3) in front of the (M) in the expression, is the constant which gives the correct numerical value to (A_s) relative to (A). You know that the formula is based on (A_s) being 1/3 A, under normal conditions.

Factors That Aid Stability

There are two factors which, if used correctly, will increase the longitudinal stability of your plane, or allow you to reduce the stabilizer area without a loss in stability. They are a low center of gravity and a high line of thrust relative to the center of gravity.

Let us see what is meant by a low center of gravity, and analyze its action. In this case, the word "low" means low relative to the center of lift. The center of lift is that point at which the resultant lift on the wing acts. It is shown at (L), Fig. No. 102, and is located on a line (AB) halfway between the centers of lift (A) and (B) of the right and left halves of the wing. The center of gravity is shown at (C.G.). It is located below the center section so we designate it as being "low".

Now let us see why it increases the stability of our ship. In Fig. No. 103 the center of gravity is at (C.G.) well below the center section. The weight of the plane acts downward at C.G. in the direction (R). The center of lift is at (C.L.) and the lift (L) acts vertically upward in direction (L). The plane in this case has nosed upward out of the normal level line of flight. We have taken the center of gravity to be located directly under the center of lift when the plane is in level flight, presuming that the stabilizer is set neutral and creates no force upward or downward. Thus, when the plane noses upward as shown, the (C.G.) moves forward from (P) to point (C.G.). In this position it forms a counter clockwise couple with (L), which tends to rotate the plane back into level flight. The righting moment is equal to force (R) times distance (C.G. P). It is obvious that the more the plane noses upward out of the level flight position, the greater is the moment generated by (R), tending to bring it back to normal flight position. It acts like a pendulum always resisting displacement and trying to right the plane when it is displaced.

Now suppose the center of gravity was lower, at point W, directly under the center of lift when the plane was flying level, but that it has been nosed upward the same amount as in the first case taken above. The center of gravity located at (W) has now moved forward to (W′) on a line from (C.L.) through (C.G.). Being lower than in the first case, it has moved farther forward, thereby creating a larger righting couple. This couple is proportional in value to (R′) times distance (W′W). (R′) is the same in value as (R) but the distance (W′W) is greater than (C.G. P).

(Continued on page 47)

Air-Ways Here and There

(Continued from page 39)

Romanowski 15, Sherwood 12, Du Flon 11 and Skokna 5. There are two prizes in each event, a silver trophy for first place and a medal for second place winners.

The other seven events of this contest which were to have been held Friday, April 6th, were postponed to Saturday, May 5th, due to important repairs which were being made in the armory. This postponement gave all members almost a whole month to prepare. The following events were held May 5th at 9 A. M. sharp:

Event 5: Catapult-launched gliders, Class A. *Event 6:* Catapult-launched gliders, Class B. *Event 7:* Hand-launched gliders, Class A. *Event 8:* Hand-launched gliders, Class B. *Event 9:* Stick model hydroplanes (R.O.W.), Class A. *Event 10:* Fuselage model hydroplanes, Class B and *Event 11:* Autogiros of any type and class. Class A models were not over thirty square inches of main wing area. Class B models over thirty but not over one hundred square inches, main wing area. (Winners not determined at time magazine went to press.)

Eastern States Outdoor Contest

This year our annual outdoor contest was held in conjunction with the Eastern States Model Meet at Newark Airport on May 19th. There were three events: Stick Duration, Fuselage and Gas Models. First two events were Class C; i.e., over one hundred and not over one hundred fifty square inches, main wing area, weighing one ounce for every fifth square inch of main wing area. This contest was sponsored by the Bamberger Aero Club and Universal Model Airplane News. Any boy winning the most points is to represent the Eastern States in the National Meet, the highest Bamberger Aero Club point winner will represent this Club at the National Meet. Further details and names of winners will appear in our next issue.

Station WNEW

Richard Biow of 993 Park Avenue, New York City, writes in to remind us that there is a radio club over station WNEW which operates on 1250 kilocycles. The club members are instructed by the well-known Casey Jones. Mr. Jones is on the air every Monday, Wednesday and Friday at 6:15 P. M. All that is necessary to join this club is to send a postcard or letter to station WNEW.

Hawk Model Aero Club

Georgia is becoming air-minded. We have a card from J. H. Chapman of the Hawk Model Aero Club, Atlanta Technological School, Atlanta, Ga., which tells us of the activity in this state. He says, "We would like all boys who live in Georgia to get in contact with us and join. We hold our meetings each Friday and Wednesday. At present we are small, having seventy-four members; thirty juniors, twenty-five seniors and an advisory board of eight members. Mr. Ward is our instructor." At present they are working on a nine and one-half foot gas job and promise to send a picture of it as soon as it is completed. We hope that the picture will show the model in flight. Mr. Chapman wishes us to tell our readers that they would like to have other clubs correspond with them.

Correspondents

The following model airplane builders would like to have readers of Universal Model Airplane News correspond with them:

Jack Landage, 311-13 Street East, Prince Albert, Saskatchewan, Canada.

Reid Patterson, 325 East 7th Street, Charlotte, N. C.

Phil Cosores, 7 Thorndike Terrace, Swampscott, Mass.

J. Rodgers Magee, 753 Seymour Avenue, Columbus, Ohio.

Phil Thompson, 3419 West 17th Street, Philadelphia, Pa.

Josef Feder, 2618 South 6th Street, Philadelphia, Pa.

Joe A. Simerson, 1717 Monroe Street, Lynchburg, Va.

Happy landings until next month!

Fundamentals of Model Airplane Building

(Continued from page 10)

Directly in the center of the elevator and over the center of the top of the fuselage, cement the rudder. Be sure it forms right angles with the elevator. Its sides must be parallel with the sides of the fuselage.

The wing is cemented on the fuselage, as shown in the plans. The top of the fuselage, where the wing is located, must be cut in the form of a slight groove to fit the form of the wing at its center. This was shown in detail last month. Turn to the June issue, Page 10, which shows the plans. Note "Section A-A" of the plans, which shows how the nacelle is cut in the form of a shallow "V" to accommodate the wing. The top section of the fuselage of this glider is cut in the same manner.

The proper position of the wing is shown under "Wing Position" in the plans, (see "Side View" and "Plan"). The leading edge of the wing at its center protrudes over the level top of the fuselage a distance of ¼", which makes the trailing edge come to within 1/16" of the rear of this section. When cementing the wing in place, see that both wing tips are level with each other and an equal distance above the level on which the fuselage rests, when the fuselage is perpendicular to that level.

Go over the entire model with sandpaper. Sand lightly to remove excess glue. The nose of the fuselage is now weighted to obtain the correct center of gravity location. Note that this is given in the "Side View" of the plans and is indicated by the letters "C.G." Balance the model at this point, as explained in the June issue on Page 42, with an illustration on Page 9, under Fig. 4.

Small brads are thrust into the nose of the fuselage until enough weight has been added to balance the glider at the point indicated by "C.G." This is shown in the side view of the plans.

Launching

In Fig. 3 will be seen an illustration of the correct method of holding a contest glider for launching. The arm is brought well back, swept forward, and the glider released with its nose pointing slightly up and its wing in a vertical bank position. In Fig. 4 the result may be seen. When the glider leaves the hand, it shoots up and out: the upward flight due to the position of its thrust, while the outward circle is the result of the vertical bank position of its wings, which naturally turn it toward the right.

As the model climbs, it slowly rights itself in the air and its soaring flight starts. It may continue to glide in wide circles, which is desirable, or air currents may carry it into other flight courses. The beginner should realize that such launching is not easy and that considerable time and practice must be given the side arm launching before the new enthusiast will master it, but experts agree that it is far best, so keep at until you yourself can get the most from your glider by this method.

Glossary of Terms

BALSA. The lightest wood that grows and widely used in model airplane work.

DIHEDRAL ANGLE. In model airplane construction and designing, refers to the height above center of the wing that the wing tips are set. (Aviation) This is obtained by inclining the main wings of an airplane up from the center of the fuselage so that the tips are higher than any other portion of the wings. This angle is measured from the chord of the wing to a line drawn perpendicular at the intersection of the two wings, if they were elongated equally at the fuselage until they met.

ELEVATOR. A hinged or pivoted auxiliary, horizontal surface or wing which controls the up-and-down direction of the airplane. It is part of the tail unit or assembly.

FUSELAGE. Body. That portion of an airplane to which the wings, tail unit and landing gear are attached. It is streamlined and it contains the power plant, cockpit or cabin for passengers and pilot, cargo, gasoline, etc.

GLIDER. A light, motorless form of aircraft similar to the airplane. One who glides.

LEADING EDGE. The edge that leads. The foremost, or front edge of a wing or a propeller. That part of a wing, elevator, fin or rudder which leads all other parts of the structure to which it is attached.

NACELLE. An enclosure designed to accommodate the passengers or power plant, or both. Usually limited to the pusher type of aircraft, it is shorter than the average fuselage and larger than the average cockpit. When used in reference to balloons, it indicates the passenger basket suspended from the gas bag.

RUDDER. A hinged or pivoted, movable, vertical auxiliary airfoil or surface, designed to steer an aircraft about its vertical axis. A flat or vertical wing, situated on the stern of aircraft, which controls the left to right movement horizontally.

SWEEPBACK. The acute angle between the lateral axis of an airplane and the projection of the axis of the wing on the plane which includes the lateral and longitudinal axes. (Note: The axis of a wing is a line through the centroids of the section of the wing).

TAIL UNIT. The rear portion of an aircraft which includes the rudder, elevators, fin and stabilizers.

TRAILING EDGE. The edge that trails. That part of a wing, elevator, fin or rudder which trails all other parts of the structure to which it is attached.

WING. A general term used to express the main supporting surface of an airplane. Usually designated as the right, left, upper or lower wing.

Is France Supreme in the Air?

(Continued from page 37)

Behind these machines, the French have what is probably the largest group of potential pilots in the world. In France every citizen is legally a private in the army on leave, who can be called into service in the event of war. The government is making an effort to keep as many of these potential soldiers in the aviation wing as possible, a trick made easier by the fact that in the French air service most fliers are not officers, as in ours. Even the big four and five-seaters are usually commanded only by sergeants.

If any one of these potential soldiers, an ordinary French citizen, wants to take up flying, the government will pay half the cost of teaching him to fly. If he is a young man who has not yet done his year and a half of compulsory military service, the government will pay an even larger percentage of the expense and count the time he spends learning to fly against the performance of that military service.

It's the same with the machines. If a Frenchman wants to buy an ordinary aerial runabout, he discovers to his delight that the government will pay ten per cent of the cost for him. The bigger and faster the plane, the larger percentage of the cost the government will pay, till he gets up into what they call the "grand sport" class; that is, a high-speed racing plane that will do 200 miles an hour or better. The Frenchman who wants to buy such a machine finds that the nice old Santa Claus government will pay a good half of the purchase price for him.

And no wonder, for a man who can fly a "grand sport" airplane is a ready-made pursuit pilot, complete with machine, and the French government wants to have a lot of them around. They would come in handy in that next war.

The Development of the Fokker Fighters

(Continued from page 41)

Travemunde, a fishing town on the Trave river on the northern coast of Germany.

Included merely as a curiosity, is a photograph of a water apparatus built by Fokker and known as the W.III. This affair seems to be, by all intents and purposes, simply a sea-going air-propelled ice-boat, the runners having been replaced by three floats of the proper size. This should prove of considerable interest to those persons who at the present time are interested in contrivances of this sort.

Though relatively unimportant as far as the Fokker Fighters are concerned, these seaplanes are included to again prove the contrary to the statement that Fokker built no two-place ships during the War.

In the next installment of this series, you will see how Fokker's Dreidecker proved the undoing of the Albatros line and paved his way to Allied respect: also the Fokker V.I which, had it appeared in 1927, would have been accepted as the last word in aerodynamic design!

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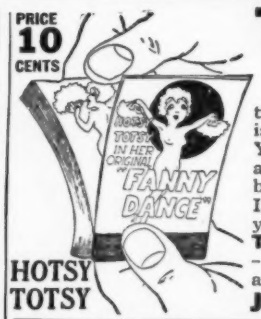

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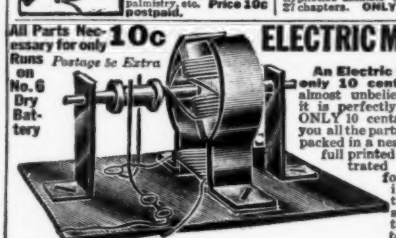

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The Aerodynamic Design of the Model Plane

(Continued from page 42)

Actually, (W'W) is to (C.G. P) as (C.L. W) is to (C.L. P). In other words the righting tendency generated by a low center of gravity is proportional to the distance of the center of gravity below the center of lift. This is obviously true even if the plane noses downward and the center of weight swings to the rear of the vertical line through the center of lift.

If the center of gravity is *above* the center of lift as at (H), it moves *backward* when the plane noses upward, thus causing a disturbing couple instead of a righting one. It tends to force the tail down and the nose up out of level flight position still more. This fact illustrates why a high-wing plane is much more stable than a low-wing. In the case of the high-wing ship, the center of gravity is low, while in a low-wing plane it is usually *above* the center of lift. This latter condition may be all right for a full size plane where the pilot can control it every instance and stability is not considered to be as important as efficiency and incidentally pay-load, but in the case of a model that must do its own flying without the guiding hand of a pilot, it is to be avoided whenever possible.

This explains why it is difficult to design a low-wing plane that is not "cranky." About the only way to cure such a condition in a low-wing, is to give it plenty of dihedral, (1½ inches on *each wing* to every foot of span), thereby raising the center of lift, and to equip the model with heavy wheels, which will lower the center of gravity. In this way you can create a comparatively low center of gravity.

Next month we will analyze the effect of the position of the line of thrust relative to the center of gravity. Until then, keep out of tail spins.

Aviation Advisory Board

(Continued from page 30)

being used is to cut balsa wood with a novelty saw. This is a saw in which the teeth do not have any set. It gives a very smooth cut.

Question: What is the major advantage of an inverted engine?

Answer: An inverted engine allows the propeller shaft to be placed higher than usual. Thus, the whole machine may be lowered and yet allow proper propeller clearance of the ground. In lowering the plane it is obvious that the landing gear may be made shorter; this gives less resistance.

Question: Please explain intake stroke on a four cycle engine.

Answer: The intake stroke on such an engine is the one in which the piston is moving down with the intake valve open and the exhaust valve closed. On the up stroke following this down stroke, both valves are closed, so that the gas is compressed. Just before the top of the stroke the spark plug fires the mixture; the piston is than forced downward on the upper stroke. Both valves being closed on the up stroke following this down stroke, the exhaust valve opens and the piston moving upward, forces out the burnt gases. At the top of the stroke the exhaust valve closes and the intake valve opens, the piston moving down again on the intake stroke.

Question: What is a geared drive engine and why is it used?

Answer: A geared drive engine is one, the propeller of which is driven through the crankshaft. It is used in order to reduce the propeller speed below the speed of the engine. This allows high speed engines and slower speed propellers; propellers are more efficient when turning slowly. It is not advisable usually to have the propeller speed greater than 1700 to 2000 r.p.m.

Question: Does the thickness of music wire go up with the number?

Answer: The thickness of music wire goes down with the number in the scale which we have been accustomed to using.

Question: What does parasite drag mean?

Answer: Parasite drag means the resistance of the structure of parts of an airplane which do not afford lift. All resistance accessory to the wings is "parasite drag."

There are quite a number of questions here from Mr. Beaupre which we cannot answer because of lack of space in this month's issue. We will answer them later.

We have a letter from John Graham of 7 Court Street, West Haven, Conn., in which he asks several questions. He requests that we write to him but we feel that his questions might help others who may like the information. So, here they are:

Question: What is a dead-stick landing?

Answer: A dead-stick landing is a landing made by an airplane whose propeller has ceased to be driven by the engine.

Question: What is a slipstream?

Answer: A slipstream is the draft of air driven backward by the propeller as it revolves. This stream of air travels approximately 20% faster than the air outside of the stream.

Question: What is a wind cone?

Answer: A wind cone is a device by means of which a pilot may determine the direction from which the wind is blowing when he is flying and wishes to land.

Every flying field has a wind cone, placed in a prominent position. The plane should always land into the wind.

Question: What is the fuselage?

Answer: The fuselage of an airplane is the structure which encloses the vital parts of a ship, such as the engine, pilot, gas tanks, instruments, etc., and which holds in their relative positions, the wings, the landing gear and the tail surfaces.

Question: What is drift?

Answer: Drift is the sideways travel of an airplane while it is in flight. This sideways travel is measured relative to the ground. Actually the plane is traveling straight forward through the air. It occurs when an airplane is traveling in a wind which is blowing from the side.

Question: How is drift corrected?

Answer: Drift is corrected by nosing the ship slightly into the wind so that it is actually traveling in the desired direction relative to the ground.

Question: What is a cockpit?

Answer: A cockpit is that space in an airplane which is designed to hold the pilot, instruments and any apparatus which the pilot must operate.

Question: What is the landing angle of a plane?

Answer: The landing angle of an airplane is the angle formed by the longitudinal axis of the airplane to the ground when the machine is resting on its wheels and *tail* skid. Usually this angle is such that the wings will take the air at approximately 15° when the airplane is making a three point landing.

Norman Scheule of 138 Brookline Blvd., Brookline, Upper Darby, Pa., wants to know the answer to the following question:

Question: What relation is there between the center of gravity and the center of pressure?

Answer: This question may be answered by saying the relation is all the difference between flight and a fall. To be more explicit, the center of gravity is that point, at which, if all the individual weights of the airplane were concentrated, the plane would have the same flying balance. It is the center of weight of the airplane and is the point at which we consider all the weights of the airplane as concentrated. An airplane suspended at this point will balance perfectly.

The center of pressure is the point at which the resultant of all the small lift forces act. We take this point as the point at which the total lift of the airplane acts. Lift always acts in an upward direction; gravity acts downward, opposite to the lift. In an airplane the center of gravity usually should be slightly ahead of the center of pressure or directly under it.

Question: What is the difference between the angle of incidence and the angle of attack?

Answer: The angle of incidence is an angle which is built into the structure of the machine and is the angle that the chord of the wing makes with the line of thrust. The angle of attack is the angle that the chord of the wing makes with the relative wind at any instant. That is, in general terms, the angle at which the air strikes the wing. As a plane is in flight, this angle changes constantly with the different speeds of the airplane. The angle of incidence is always constant. Remember, the angle of incidence is the angle of the wing chord to the line of thrust, the angle of attack relates to the relative wind.

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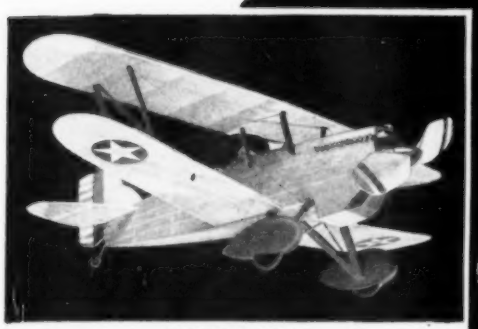

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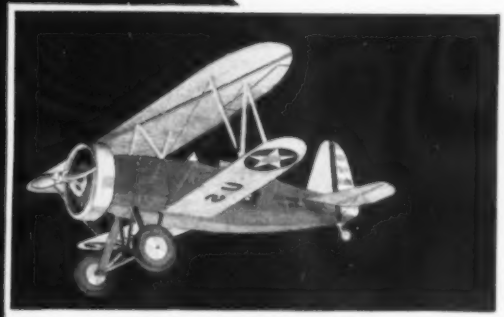

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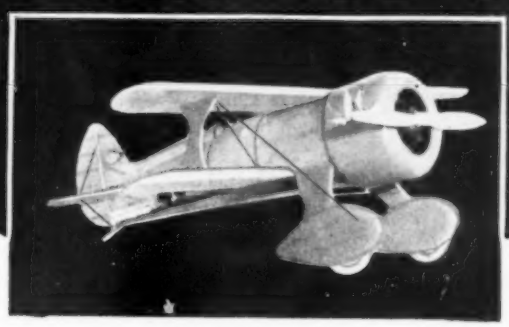

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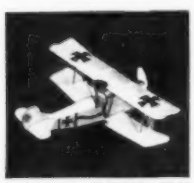

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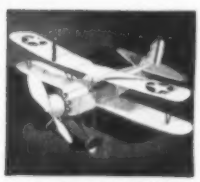

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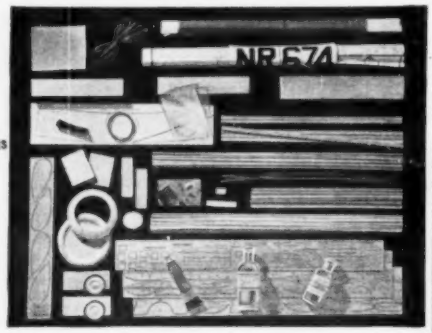

This photo of the parts in the Wedell-Williams kit is typical of the completeness of Comet kits!

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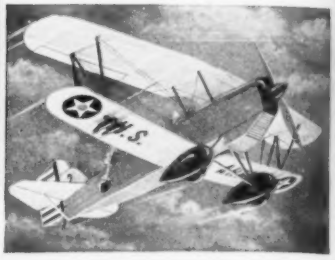

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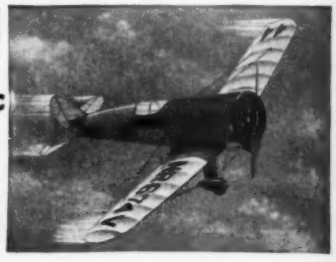

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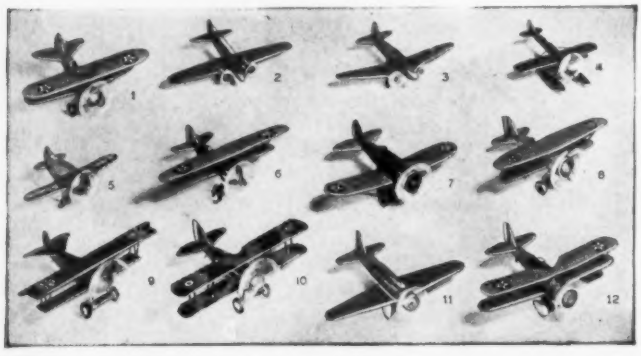

DIPPER
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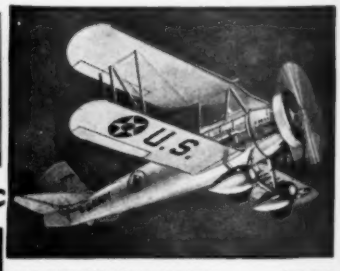

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